

THE BIOLOGIST

A Quarterly Journal Promoting Research
Interest in the Biological Sciences

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THE BIOLOGIST

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BIOLOGY IN OLD CHINA

By Lester P. Coonen, Ph. D.

University of Detroit

Detroit, Mich.

INTRODUCTION

The ancient East, with its various hubs of religious, social and political activities, produced several cultures which were not destined to remain separate and sharply defined. As they spun through the centuries, fragments of influence were centrifugally hurled into neighboring cultural eddies. And those adjacent vortices likewise flung out their particular bits of influence to *their* neighbors.

Thus we oversimplify our sketch of the stultified social intercourse impeded by suspicion, tradition, language, race and religion. Even though the total effect, when seen in the perspective of Time, seems to have resulted from a hop-skip-and-jump sequence, actually the process has been extremely slow and diffusive. China, with her strong familial and oppidan cohesion (*figure 1*), always has been singularly reluctant to accept strange people and imported ideas. A modern manifestation of oriental aloofness lead Perry to pry open Japan's door in 1853. Others had knocked repeatedly and waited impatiently since it

had been slammed shut about 200 years before.

Early sciences, and other struggling disciplines, advanced slowly and haltingly across the sociological hedge-rows. From area to area, meeting various degrees of general acceptance or indifference, they sometimes moved without leaving tracks. And to make the tracing of customs, ideas, and "scientific" practices even more difficult and unsure, these serpentine paths meander three-dimensional courses through Time, Geography, and Culture.

An orderly chronicle of events cannot be presented as a trellis to support the vines of prehistory and early history of China. We need to resort to historiographer's license and present a logical guess that most of China's early interest in biological phenomena was utilitarian. Much of that which suggested a probing into the world of biology was, strictly speaking, not science; rather it was biological mores.

Progress was neither steady nor rapid. Communication, travel, writ-

ing, social and political intercourse were such that an idea, even a good one, might meet insurmountable obstacles to its diffusion and general acceptance. Sometimes a step forward was followed by two steps backward, and some steps may have represented a century, or even more.

First paths of Chinese history wind over the horizon of discernable fact into the netherland of dim and fanciful legend. What is worse, the germs of truth are probably knotted about by incredible fables. And so, across the canyons of Time come unmistakable sounds, but are they words or winds, ideas or time-enameled lies? Some of those accepted biological "discoveries" are disguised as whispers or whimsies; most were yet deeply concerned with human physical needs, elementary and alimentary. Biological knowledge for its own sake is rarely detected back here in the early Orient.

Historical individuals of ancient China are comparatively rare, and those whose names are glorified by tradition and early writing are supported by flimsy testimony. On occasion, an indistinguishable cog in the wheels of peasantry probably discovered a mental gem only to lose it to his theocratic ruler who, in turn, polished it and claimed it as his very own. Royalty too often received credit for discovery and invention. For instance, we are told by respected tradition that to Shen-nung (ca. 2800 B.C.), one of the earliest legendary emperors, belongs the paternity of both medicine and agriculture (1). And to him is credited an early book on plants (2).

That practice seems to have continued through the ages: a few hundred years ago, a new and improved grain, "Imperial Rice" was found as a mutant by Emperor Khang-hi (1). Tradition says he found it as a single plant maturing conspicuously early in a field of rice. Gathering the seeds, he perpetuated and multiplied the new variety in his royal gardens; later he made it available to the peasants, by

whom it was widely acclaimed. Chinese emperors of the time were neither humble nor agrarian; they were aloof and isolated from the common people, and not likely to participate in phenotypic selection of cultivated plants. Then, are these facts, or fancies? Perhaps they are true, but they could be tales incubated in the balmy environment of an oriental court. Split bamboo pieces which first bore the oldest of these legends may suggest the etymology of "bamboozle." So, in many cases we are unable to pin medals on historical figures of ancient China. Usually we must be content to learn what country or province generated these unnamed heroes; then make the awards to the time and place which produced them; and studiously avoid the usurping dignitary in power.

The most telling and penetrating approaches to the sciences were in the fields of mathematics and astronomy (3), but food procurement was the greatest of common interests. There were others, to be sure, but practical knowledge of plants and animals was tantamount to remaining on the right side of the sharp line between starvation and survival.

Plants and Animals

The immediate environment presented a host of energy-containing foods. Time, skill and good fortune enabled these peoples to find delectable fare in the countryside. Besides the larger mammals which were hunted or domesticated, several local and unique animal products were utilized. If diversity suggests refinements, then the ancient Chinese reached a high social level reflected in their diet. Avian saliva, fashioned into the edible "bird nest" is an example of unique gustatorial adventure. This long-perpetuated and highly extreme fare is prepared in the Orient by gathering and cooking the cave wall nests of certain South Asian swifts, especially *Collacalia fuciphaga*. Esthetically shocking? Perhaps. Yet saliva, an organic substance, molded upon the cave

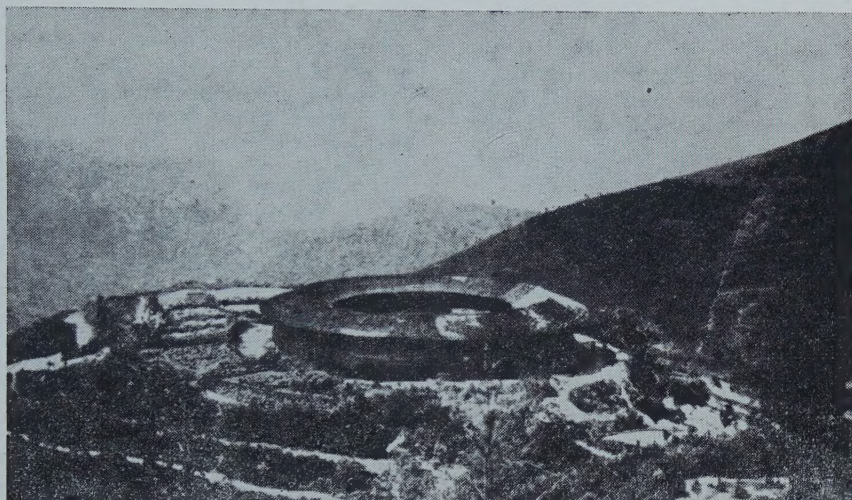


Figure 1. A Chinese Circular Clan House. Although this large sociological unit, with its common denominator of blood-lineage, had wholesome effects, its centripetence prevented or impeded progress. (From *China's Story*, by W. E. Griffis. Boston: Houghton Mifflin. 1911).

wall is logically as acceptable as albumen, another secretion which oozes from the walls of the avian oviduct and uterus. Such is the hen's egg, a respectable item on our menu.

Naturally, China's concern with practical zoology lead her domestic providers to the ocean. Since her coastline extends upwards of 2,000 miles, her people learned to lean upon the usual complement of marine fishes, molluscs, crabs and lobsters — and more. The enterprising and practical naturalists of the East utilized the sea cucumber. After drying, and sometimes smoking it, this relative of the starfish became the main ingredient of a soup called "trepane." Among other littoral and pelagic sources of China's food is the cuttlefish, a modified version of the octopus.

Traditionally, Chinese love the soil and are expert at producing diverse and bountiful crops from it. Of them, it is said, "Give a man secure possession of a rock and he will turn it into a garden." (3). And her government

shares that same respect for the soil and its products; it has fostered progressive agriculture, drainage, irrigation and mulberry planting, as well as other measures of farm relief (4) — in ancient and medieval times. Not that the Chinese farmer lacks independence and resourcefulness: for centuries he has known that dividends earned from fallow land are genuine. He did not hesitate to abandon a field after a few crops (1) to use it again after it had rested a season. His harvest was greater per acre and his man-hours were more productive. Many sound practices are referred to in the *Odes of Pin*, a poetically presented seasonal chronology on farming, dated about fifteen centuries before the birth of Christ (1).

Besides notable pioneering work and subsequent advances in the cultivation of tea and oranges (1), dozens of varieties of soy beans, rice, barley and other cereal grains, the Chinese peasant has developed a kind of bamboo economy. This giant member of

the prosaic grass family has served China long and well. What to us is the classical fishing pole, has been to the Chinese the substance of lumber, furniture, writing material, plumbing pipes, hats, brooms, umbrellas, toys, pans, baskets, bird cages and, when young and succulent, food.

In addition to the many flowers such as the rose, morning glory and chrysanthemum, which all probably first bloomed in Chinese gardens and doorways, a host of exotic plant species were collected, grown, cherished and publicly admired in botanic gardens (5). This practice of collecting, coaxing and cajolling of rare and exotic flowers and trees suggests an intense interest in the plant world and is only *tangential* to practicality. This is the region where "pure" science thrives. True enough, the ancient Chinese were agrarian and practical, but in a narrow sense, some were pure botanists.

Several pharmaceutically important plants were first found and nursed in this ancient land. For instance, medicinal virtues of two species of the xerophyte *Ephedra* were known for thousands of years. Thus, sufferings from asthma and hay fever long have been alleviated by derivatives of this weed. Now its active alkaloid is known to be ephedrine and is widely used for certain nasal and sinusitic obstructions. Reed (1) believes several Chinese botanists outdid the Greek physician-botanist Dioscorides (ca. 50 A.D.), and several of them preceded him by centuries.

To Emperor Shen-nung is credited the twenty-chapter Medical Herbal (5) of almost 5000 years ago, but whether or not his royal brush actually crystallized the ideas and recorded the data is beside the point. Here was the vade mecum of medicinal plants, organized by *someone* twenty-six centuries before Dioscorides gasped his first Cilician breath. Drugs and drug plants, many of them contained in the famous Herbal, were used since an-

cient times in an unbroken succession of prescriptions, down to recent or present times. Rhubarb, ginseng, opium, aconite, pomegranate root, and even compounds of the inorganics mercury, arsenic and sulphur, are some of them. Sarton (6) feels that China's first purely botanical work appeared about 3500 years later, by Chi Han, containing references to 80 species of plants from southern China.

Agar-agar, the vegetable gelatin derived from marine algae, especially of the genus *Gelidium*, was probably first used as a Chinese food component and a medicine (7). Ultimately it became a laboratory substance important in modern medicine, dentistry and bacteriology. Other brown and red algae were described in an eighth century materia medica. One, a member of the genus *Porphyra*, was prescribed for dropsy (7).

Chinese ingenuity has fathered several unusual applications of biological products and phenomena. The silkworm, larva of a drab moth, seems to have been employed by man since 2600 B.C., when the Empress of Huang-Ti domesticated it, or sponsored its domestication. Silk fabric was so valuable that it has served at times as the epitome of real wealth and even as legal tender. In 815 A.D. 50 million pieces of it were set aside governmentally for military expenditures (4). The list of practical biologicals goes on: Shellac, the commercial resin, a secretion of the scale insect *Coccus lacca*, has met wholesale utilization in China, India and other oriental countries.

According to Chi Han's Document (209-307 A.D.) (1), the Chinese farmer learned to benefit by pitting one antagonistic organism against another. This was the "antibiotic" concept employed on a macroscopic level, in ancient times. He enlisted entomophagous ants "attached to trees" to destroy a "boring insect."

Artificial incubation of fowl eggs was practiced in China even before her

records were being compiled. And Chinese ingenuity found a way to test the heat of the eggs. Needham (8) says man's eyelids were employed as ready and sensitive thermometers to check the temperature during incubation.

Writing and Recording

What modern students of crime and criminology have recently learned about dactylography was old and everyday "office practice" in ancient China. Finger prints were legal signatures there before the Mediterranean peoples had thrown away their stone tools. But we owe much more to this ancient civilization; she gave us the materials upon which we write.

China's split bamboo was an inferior writing medium, especially because "books" were cumbersome bundles of rattling sticks. Silk fabric offered some advantages in weight, but it was expensive and difficult to work with. Babylonia's clay tablets were impossibly unwieldy; Egypt's papyrus was much better. In fact, papyrus was best — until China snatched the uncontested lead about 105 A.D., when she introduced paper. No doubt, this was her greatest contribution to world culture and civilization. It was an unconscious and anomalous gift. The Great Wall of three centuries earlier is the darling of too many writers; it is often cited as the high-water line of progress. Actually, it was a deterrent to the diffusion of culture. It dammed people physically and mentally to isolation, a cherished Chinese objective "enjoyed" for 4000 years (9). Paper was destined to do the opposite. And both the invention of block printing, and the printing of the first book, probably antedate Europe's first similar attempt by five centuries (4).

To be sure, wasps were the first papermakers, although their product was structural material for their papier mache homes. Ts'ai Lun, a Chinese court attendant, and probably an astute "entomologist," was the pioneer papermaker among men (4), for legend says he learned the principle from

wasps. Ultimately papermaking became standardized in China. Soft, inner bark of the mulberry tree was macerated in liquid to a fibrous slop; dehydrated to a thin tough film; and cut into uniform sheets. And lo! there was the microfibrillar pathway along which roared the intellectual progress of man. Not only was this a biological derivative, but reflexively it was to be the light, convenient medium to record the romance of biology's own life story.

All other civilizations ultimately adopted the delicate sheets of cellulose to record their progress and exchange their ideas. In the year 751 Arabs captured a few Chinese papermakers in Russian Turkestan. Under duress, the captives relinquished their secret. Thus paper began its slow journey to the West. Greece learned of it and received her first paper from the Arabs in the eleventh century; Spain, from the Moors, in the twelfth; France, a few years later — perhaps through Peter, Abbot of Cluny. In the thirteenth century Italian and French paper "mills" began to hum; in the fourteenth and fifteenth, Germany and the Netherlands were making their own paper; and finally, in the sixteenth century, England had her skilled laborers, now newly proficient in the art. But forever thanks to ancient China, for she mothered papermaking.

Medicine

China's medical lore shifted from Stone Age practices, through her unknowable later periods of prehistory, to historical ones. Broadly considered, the advances were not rapid, nor far. After all, much of China is still treated to barbaric therapeutics and primitive surgery. Despite the muddle of ignorance, bizarre mysticism, and refined but futile manipulation, a few brilliant discoveries and "near discoveries" met common usage without understanding or analysis. But lack of understanding and analysis does not necessarily exclude data from the body of science. If it did, we should have



Figure 2. *Examination Stalls*, where the Chinese student spent days in reflective isolation to prove his ability to recall law, history or medicine. Often in her long history standards were rigid, her scholarship revered. (From *China*, by H. F. McNair, Los Angeles: U. of Calif. Press. 1946).

little left. Do we have all the answers to light, growth, protoplasm, the atom, and a thousand other phenomena which have been incorporated into our science?

In certain periods and places (there was much diversity here) when an indifferent youth failed at the usual trades and hornyhanded occupations, he chose the lowest of social strata, that of the physician (3). In other times and areas, however, rigorous training and stiff examinations were used for effective screening of medical practitioners. The physician was in such times, of course, held in high esteem. Garrison (5) claims that provincial medical examinations were instituted and in force several centuries before Christ. Such educational rigors were artificial but effective props for scholarship. And scholarship was a

precious thing. The scholar was placed ahead of farmers and artisans, at the head of the list; traders were lowest and last (10). His stooped shoulders and delicate hands have been marks of highest honor; they were signs that he attained his scholarship through sacrifice and sustained effort. Competitive examinations were the last lofty mountains he climbed to reach his final distinction (4). In private stalls (*figure 2*), under strict supervision, he struggled several days with his memory and reason to prove he had reached the accepted standards of scholarship.

Another Chinese custom, endorsed and accepted during at least one historical period, placed the physician in a constant treadmill of trial and anxiety; the practitioner's work was appraised at the year's end; his salary

was determined by his degree of competence (5).

Neiching, the Cannon of Medicine, calls across the centuries for recognition. Again, the putative authorship points to the royal Huang Ti or Shen-nung, legendary emperors, one of whom supposedly wrote it on strips of bamboo about 4500 years ago. Some of its medical procedures and *materia medica* survive with no alterations.

Sometimes strange and questionable practices evolved and tenaciously persisted for centuries, with little more than revered traditions to justify them. The practice of acupuncture was such. Beginning in 620 A. D. and continuing even today (11), this complicated medical rite has received unmerited honor and respect among certain Chinese. Or shall we say that we today cannot understand and endorse the procedure as "scientific?"

According to that school, deeply piercing the body's tissues was considered effective therapy against certain ailments. There were 388 areas (12) on the human body which could be pricked by needles without piercing arteries or vital visceral organs. Considerable hazards were involved, for the various types of needles were up to eight inches long (13). Specifically safe areas were elaborately mapped, and annotated in appropriate Chinese symbols, on illustrations of the human figure, (*figures 3 and 4*). Usually the gold, silver or steel needles could be inserted by hand, but in some "tough" areas a mallet was used. The neophyte or "intern" acquired skill and proficiency by pricking needles through paper coverings draped over a bronze statue of the human body.

Moxae, another unique principle and practice, met with favor and much refinement in Chinese medicine. The dried leaves of *Artemisia vulgaris*, a smelly cousin of our sagebrush, were formed into small cones, attached to the skin in an area which demanded

"healing"; then they were ignited. How many cones to apply and where to place them were secrets known only to the expert, for the rules were many and elaborately involved. Both acupuncture and moxae were employed for sprains, bruises, rheumatism and other conditions which needed medical attention.

Infinitesimal details and infinite variations were the essence of medical "sciences" in ancient China. Michael Boyne, a 17th Century Jesuit missionary, wrote on this medical lore. He stated that ten thousand kinds of fevers were catalogued; fourteen kinds of dysentery were recognized and the pulse had myriads of interpretations in different parts of the body (5) (12). Pulse lore reached the height of its popularity in the sixth and fifth centuries B.C., but its influence was to survive for more than a score of centuries. Europe embraced the unfathomable variable-pulse doctrine in the 18th century (12).

As early as 1105 B.C. statistics on diseases were published annually (5), which certainly smacks of progressivism and perspective in public health. To record and study and compare the undulating statistics of epidemics and pandemics was sound procedure. There is no better point of departure to determine the general health picture.

Physical anthropometry originated here. Measurements of bones and organs were recorded in remote antiquity. Some mensuration data were even based on studies of disinterred bodies (5).

The roots of several other progressive practices seem to have been established well over a thousand years ago in China; some as long ago as 2,000 years. Here are some of them, without details: 1. Hua To, a famous surgeon, employed a derivative of hemp (*Cannabis indica*), for general anaesthetic. The same plant is the source of the modern narcotic, marihuana or hashish. 2. About 700 B.C. the great Non Ching, a contemporary



620 A. D.



1920 A. D.

Figures 3 and 4. *Anatomical Charts for the Practitioner of Acupuncture*. Note that this practice of doubtful validity persisted for 1300 years, and still enjoys the hope and trust of some present day Chinese. The symbols tell exactly where a needle is to be inserted for a certain cure. Thus large blood vessels and vital organs are studiously avoided. (From *The Evolution of Modern Medicine*, by Sir Wm. Osler; originals from E. V. Cowdry, Peking, China. New Haven: Yale. 1921).

of Confucius, was acclaimed for his writings on arterial and visceral systems. 3. In 195 A.D. the mellifluous-named Chang Chung-ching wrote a treatise on diseases of diet, and fevers. 4. In the Sung dynasty (906-1280 A.D.) paper books and monographs

on diseases appeared. One work, "Instructions to Coroners," taught methods for detection of suicide, poisoning, and other crimes. Curiously, it became an honored *medical* text for hundreds of years.

The biography of immunology is

incomplete, but one factor is fairly certain: China played a major role in the early use of inoculation, and may have used it spasmodically during several centuries. Chinese may have discovered the principle themselves, or they may have learned about it from their neighbor, India (5). Some accounts say hopefully that it was in use in the Second Century A.D. (3); others place its inception later in the Szchuen Province, and attribute its introduction to the philosopher Gomei Shan (3). Osler (12) conservatively names the 11th Century A.D. as the birthtime of inoculation for immunization. Regardless of even the approximate time, we are confident that the methods were crude at first. Abhorrent practices of inoculation against smallpox have been alluded to in early records. For instance, the introduction of an old crusty scab into a wound of the healthy citizen was one method; another, the inhalation of powdered crusts. More revolting was the practice of inserting virus-soaked cotton into the nose of the staunch and trusting subject who desired immunity, or his voluntary wearing of a patient's clothing contaminated and putrid with the effects of the disease. Without knowing the wiley pathogen nor understanding the degrees of its virulence, the axiom "better to introduce it than to wait for it to strike" seems to have been accepted with some success, despite its aura of confused logic.

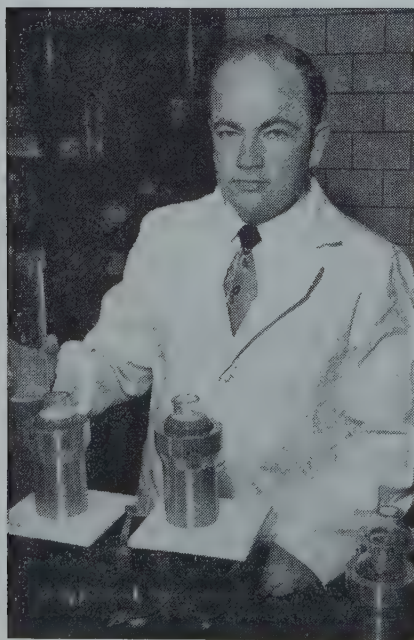
Perhaps not many of China's ancient approaches to medicine were destined to lead in the right direction. Superstition and mysticism were progenitors of a good share of the accepted principles. We might even expect this. For, after all, China was the land of dragons. Magic and astrology course all through her history (14) (4). As an example, the preparation and use of a certain tonic hinges itself upon this philosophy: it was prepared by boiling with pork a rare and precious caterpillar which had succumbed

to the attack of a specific pronglike fungus parasite (3). And perhaps it was a "tonic," for the term covers a great latitude of physical and mental effects. Only difficult analyses of masses of clinical data and statistics can prove or disprove its efficacy!

Not all of the gropings in human biology here were concerned with cure and prevention of man's illnesses. The human mind has always been capable of logic, and where it fails to employ that logic, it casts out tentative and provocative guesses. Nor are we always superior to the queued Oriental of a thousand years ago in this respect. Our journalistic literature, our table conversations, and our oft-repeated home cures are fraught with similar loose beliefs and illogical tenets. The Chinese household approached the mysteries of embryology in that way. A 17th century manual of obstetrics lists four types of scenes which were to be avoided by pregnant women: turtles, rabbits, all wicked things, and the digging of foundations for buildings (15). *Neiching*, the famous canon of medicine, contains much pleasant but aberrant verbiage recorded with the inviolate authority of the written word. Among other claims, it localizes the human faculties: the seat of thought is in the spleen; the will in the kidneys, etc. Still other classical works elaborated upon the hierarchy of organs with the heart as "King," the liver as "general," and so on, down to the spleen as "officer of the granary" (5).

Language barriers make much of China's rich store of biological history unavailable to the Western student. Confusion in the recording of dates and the spelling of names (6) keeps China's chronicle from ever appearing in bold, sharp focus. But, dim and fragmentary as they are, certain pictures of her activities in biology will always remain to enhance our respect for her several accomplishments in the face of ponderous adversities.

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KAPPAN TO ELI LILLY

Irving S. Johnson, who this year received his Doctor of Philosophy degree from the University of Kansas, joined the Research Laboratories of Eli Lilly and Company on September 1. As a bacteriologist in the tissue culture section of the Biological Research Division, Dr. Johnson will be engaged primarily in cancer studies and in metabolism studies with cultivated mammalian cells.

After attending Westminster College, Dr. Johnson graduated in 1948 from the Washburn Municipal University of Topeka with a Bachelor of Arts degree in chemistry. His graduate work at the University of Kansas was devoted to zoology and bacteriology. While at the University of Kansas, Dr. Johnson served as a research assistant and assistant instructor, teaching courses in embryology, parasitology, and general zoology.

Dr. Johnson is a member of Phi Sigma, biology honor society; the Society of Sigma Xi, scientific honor society; the Kansas Academy of Science; and the American Association for the Advancement of Science.

ON FIELD TRIPS WITH FRANK G. SPECK, AMERICAN ETHNOLOGIST

By Ralph W. Dexter, Ph. D.

Kent State University

Kent, Ohio

Early in 1950 the science of ethnology lost one of its ablest savants distinguished for his field studies among the Eastern Woodland Indians of North America. Tribute to the late Dr. Frank G. Speck has been given in the pages of several scientific journals. A brief biography by A. I. Hallowell and a complete bibliography prepared by John Witthoft have been published in the *American Anthropologist* (53 (1) 1:67-87. 1951). An appreciation of his field researches and his contributions to American ethnology was written by John Witthoft for *Southern Indian Studies* (2 (1): 39-44. 1950.), while a portrait by Reuben Goldberg and an appreciation of Dr. Speck's services to the University of Pennsylvania written by J. A. Mason appeared in the *Bulletin of the University Museum* (Vol. 15, no. 1 1950.). A. F. C. Wallace wrote a memorial for the *Pennsylvania Archaeologist* (19:51-53. 1950). An account of Dr. Speck's last trip to the Seneca Nation was related in *Primitive Man* (22:60-64. 1949). The writer had the good fortune of being associated with Dr. Speck in some of his field researches and accompanying him on four field trips in his study of surviving Woodland Indians in New England and New Brunswick. One of these proved to be his last summer research field trip. This paper is concerned with a sketch of his field methods and his personality as a field ethnologist.

Dr. Speck was among the first to approach ethnological studies through the viewpoint and methods of ecology.

While he did not regard himself as a biologist, he actually had solid and extensive training in the natural sciences, being well versed in several phases of natural history. His knowledge of field biology led him to understand at first hand the relation of environmental factors, especially plants and animals, to primitive peoples. In many of his studies he stressed the relation of certain ethnic groups and their culture to the natural resources. He encouraged some of his advanced students to pursue this line of investigation in their own researches. He viewed the native life of the Indians as a part of the ecological complex of nature. Some twenty publications were devoted to his famous studies of hunting territory and methods of taking game. A great many of his papers oriented man in his natural environment, and this often was the central theme of his writings. His interest in nature began in boyhood and continued throughout life. While he was vitally interested in all nature, he gave special attention to ferns, snakes, turtles, and birds as well as to primitive man.

He was a very keen observer of nature and man. He scoured swamps for rare ferns, scanned the sky for eagles, and was ever on the watch for the interesting and unusual. Human beings from all walks of life came within the scope of his keen perception, as he made a practice of analyzing the personalities of people he met. In the field he was always alert. In driving by a favorite swamp he would say "*Woodwardia virginiana* can be found

in there"; or on a tramp in a woodland, "The lady slipper can still be seen in these woods"; or again while searching for informants: "There is a real Indian type!" As a boy and young man he collected with the famous herpetologist Dr. Raymond Ditmars under whom he received his early instruction in field zoology. He retained his interest in reptiles throughout the rest of his life, publishing several papers on the group and on the reptile-lore of Indians. On field trips he made a regular practice of turning over logs and debris in search of snakes and salamanders and stopping by each pond, whenever it was convenient, to look for turtles. Over a period of many years he accumulated a large collection of turtles, most of which he collected in the field himself. Some of them were later used for making Indian ceremonial rattles. It is significant that in 1947 he was inducted into the Turtle Clan of the Senecas. In addition to reptile-lore he also made special studies on bird-lore of the Woodland Indians, and through his studies of utilization of natural resources contributed to the general field of ethno-ecology. He was an ardent conservationist at heart and was deeply concerned over the destruction of natural resources and the natural habitats which he loved so well.

His major research interest was in the study and description of qualitative characteristics and distinctions of ethnic groups, commonly referred to as ethnography. He was more interested in historical and ethnographic descriptions of cultures as natural phenomena rather than in quantitative analyses or theoretical speculations. He sought out and obtained the last remnants of surviving culture from many Eastern Woodland Indian tribes. He was noted for his success in uncovering the last threads of culture from some groups which were nearly out of existence and placing the data on record before it was lost to science forever.

On field trips he dressed informal-

ly in comfortable clothes and was never one to give much attention or importance to dress. He was happiest when he could relax and dispense with all formalities. In the field he wore an old battered hat of which he was very fond. He was as informal and casual in his speech and manner as in matters of dress which placed everyone associated with him at ease. He frequently puffed on little cigars, especially when he was hard at work whether in the field or at his desk. After our trip to Cape Cod in 1946, he carried a lucky-bone (an appendage from the male horseshoe crab) for more than a year, after the custom of the Wampanoag of coastal Massachusetts.

In approaching strange Indians he began conversation easily and naturally, usually with a few Indian words at the outset which broke the ice and quickly dispelled all reticence which may have been present. He got his information in a natural way as part of normal conversation rather than through a formal interview. Except when recording texts and new words he often did not take notes himself during the conversation, depending upon an assistant in the background for this and upon his own memory. At a later time he would jot down notes of special importance as matters occurred to him in re-thinking through the conversations. Such notations were often made on any handy scrap of paper. He had an unusually good memory and synthesized the results of many conversations into a unified body of knowledge in his own mind before recording the information. Dictated texts and technical details were, of course, taken down directly once he got into the more serious business of technical ethnology.

On his field trips he was usually accompanied by members of his family, students, or interested friends. His wife, Florence Insley Speck, for many years visited the Indian tribes with him and worked closely with him on many projects. She often played a special



Fig. 1. Dr. Speck on a field trip to Mashpee, August, 1940. Beside him are Miss Bertha Hicks and Mrs. Bessie Sturgis, Wampanoag Indians, standing before the Sturgis homestead used by Dr. Speck as headquarters on many field trips to Cape Cod.

role in gathering data from the women informants. She was coauthor with her husband of several papers and contributed sections to a number of others. Their son and two daughters went with them on a number of excursions. His son, Frank S. Speck, served as an assistant on one of the summer trips to Newfoundland and Labrador doing special work in photography and sound recording. Graduate students and close friends interested in ethnology as well as professional anthropologists collaborated with him on various trips which often led to publications of joint authorship. Graduate students were trained in field ethnology on many trips, and specialists in other fields cooperated in special studies which overlapped their respective fields of interest. It was the

privilege of the writer to work with Dr. Speck on certain problems of ethno-ecology in which we combined our special and mutual interests in ethnology and ecology.

Dr. Speck had a deep insight into and a practical knowledge of Indian psychology. He had great respect for the Indians and took a genuine interest in them and their affairs. He was not simply after whatever information he could get from them but was sympathetic toward their way of life, appreciated them, and gave them gifts and friendship in return. He was kindly and generous and did much for the welfare of those who were in great need. With long experience and keen perception he was able to appraise individuals quickly as to their value as sources of information. He could

soon tell those who had genuine knowledge of old Indian life and those whose knowledge was superficial and second-hand. He was quick to discern and admire the serious and bona fide Indian type but had no patience for those he called the "hurdy-gurdy Indians."

Dr. Speck was familiar with several Indian dialects. Algonquin linguistics was one of his specialties, if it can be said that he had a specialty. He enjoyed every opportunity to speak with Indians in their native tongue, but whether he spoke in Algonquin or English, he always talked to them at their own level. He was like a neighbor who dropped in for a pleasant chat. He neither lectured to them, talked down to them, nor spoke beyond their comprehension. He had none of the pretention commonly associated with college professors. When he was among the Indians he was one of them. Many Indians he knew personally by name, and over a period of many years became acquainted with their family life in detail. To many of the younger generation he could give details of their families which they themselves knew little about. He was at home in many Indian families even after a short acquaintance, and thoroughly enjoyed living with them, having meals with them, and enjoying their company and good fellowship. The Indians lost self-consciousness in his presence and eagerly gave him whatever information they could from their own experience and from what they had heard older people pass down to them. A few anecdotes and a bit of humor set off the conversation at a lively pace, and confidence was quickly won which led to the heart of the conversation out of which came the information Dr. Speck was seeking. The information came naturally and easily as part of a true conversation and not as answers to a series of questions such as a census taker might ask. Dr. Speck was a master at conversation and interviewing. In spite of

humorous stories and interesting sidelights which he injected into the talks, he never lost the main thread of his basic inquiry. In spite of the seriousness of the information being sought, his manner was always jovial with a perennial and contagious sense of humor.

Whenever making plans, mapping out an itinerary, or deciding what to do next while on a field trip, his favorite expression was "Let's take a string from the war bag." On field trips he was tireless until his last summer in the field. His enthusiasm never slackened. When not interviewing Indians he searched for snakes and turtles in the fields and woods. Only on the last trip did he stop to rest during the daytime. The field work and discussions continued until bedtime and sometimes did not terminate until he fell asleep.

He encouraged the Indians to keep alive their native language and to continue as much as possible with the crafts and customs of their heritage. While on field trips he collected Indian materials, especially baskets, for museums and research collections. These he obtained directly from Indians who made them or from the antique and second-hand stores which he visited at every opportunity. He collected more articles of material culture than any other American ethnologist of recent years.

Dr. Speck was a versatile person by nature, training, and interest. He was versed in music, art, language, and science. He combined his talents and broad interests and knowledge in the interpretation of human culture. Not only was he a scholar himself, but he was a natural teacher of others. He met each person on his own ground and shared his wealth of experience with others in a most informal, entertaining, and fascinating manner with an inexhaustible supply of stories and anecdotes. He was a master at story

telling with remarkable wit and sparkle.

In the latter years of his life he was made Honorary Curator of American Ethnology at the Peabody Museum of Salem, Massachusetts. He regarded this as one of his greatest honors. While not a person to show pride, treating lightly his own successes in scholarly pursuits, he felt greatly honored by his appointment at the Peabody Museum. He had planned to spend his retirement in research at that institution.

Mrs. Bessie Sturgis of the Wampanoag group at Mashpee once remarked to the writer that "Dr. Speck knows

more about the Indians than the Indians know about themselves." Indians everywhere admired and respected him for his friendship and for his profound knowledge of Indian culture. Above all he had a sincere love for the Indian and his folkways which welded a fast bond between him and the American natives who were quick to sense the genuine interest in their culture to which he devoted most of his life. On February 6, 1950, a week after being reluctantly carried away from the Seneca tribe in his final illness, he drew his last string from the war bag.

FREE ANTIBIOTIC MOVIE

New Squibb Film Shows How

The amazingly complex process of manufacturing the so-called wonder drugs, such as penicillin, is simply and dramatically set forth in a new 25 minute sound film, from the magic camera of Louis de Rochemont, entitled "... And the Earth Shall Give Back Life."

Filmed against a vivid background of the actual production of penicillin in the manufacturing laboratories of E. R. Squibb & Sons, "... And the Earth Shall Give Back Life" explains for the layman just what the wonder drugs are, what they do, and how — when they are used — the earth is in effect actually "giving back life."

This new motion picture, readily available for showings before service and luncheon clubs, schools, church groups, etc., takes its audience through the eye of an extremely powerful electron microscope to explain how disease organisms divide and multiply to reproduce themselves at a fantasti-

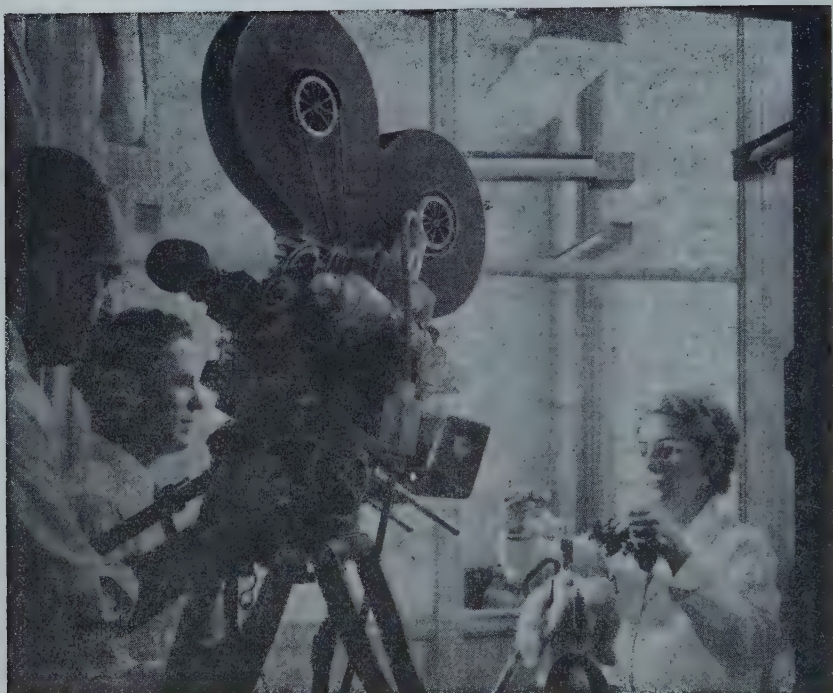
cally rapid rate.

And then, while we are still in the all but invisible world of micro-organisms, we see other infinitesimal organisms cause numerous disease germs to die or stop reproducing.

The first and still one of the most potent of these natural enemies of disease is penicillin. Streptomycin, another extremely potent antibiotic, is, the film shows, a natural mold found originally in certain soils — after thousands and thousands of soil samples were tested.

These molds, during their own growth, produce a substance, that can either kill or stop the growth of such one-time killers as scarlet fever, certain ear and throat infections, and even the dread tuberculosis.

Originally, as the film points out, the production of the antibiotic, or disease-arresting, drugs was a test tube process carried on painstakingly in re-



Dr. Florence I. Starkey, Squibb microbiologist, "seeds" a streptomycin culture during the filming of "... And the Earth Shall Give Back Life", a story of the antibiotic wonder drugs.

search laboratories. Only minute quantities could thus be produced, and the cost was extremely high.

Now, however, the large pharmaceutical houses such as Squibb, have translated the low-volume test tube process into full-scale mass production that, even so, is still painstaking.

The film shows the process in instructive and often amazing detail — huge 17,000 gallon tanks in which the mold organisms are "grown", thousands of bushels of carefully-selected grain products to "feed" the growing mold, the jungle array of stainless steel piping that carries them through each stage of growth to final "harvesting", the unending testing to assure purity and potency, the careful

process of drying under vacuum and the eventual bottling of the earth-born drug that — as it reaches the doctor — is a pure, white mass of crystals that are death to disease and life to man.

Thus it is, the film makes clear, that the earth does give back life — and promises even greater health for future generations through the unending search for and the pharmaceutical manufacture of still newer and more potent "wonder drugs."

This motion picture is available for all types of group showings. For further information write: Motion Picture Department, E. R. Squibb & Sons, 745 Fifth Avenue, New York, N. Y.

VEXATIOUS VERBALISMS

By Sister M. Ellen O'Hanlon, O.P., Ph. D.

Rosary College

River Forest, Ill.

(Read at 1953 A.I.B.S. Meetings)

When an Englishman reaches our shores he may be ushered to a room on the twentieth floor of a sky-scraper hotel. First he will step into an opening between two sliding doors each flanked with lights flashing *up* and *down* signals. The new arrival is speedily whisked vertically sometimes hundreds of feet, almost without realizing that he is moving in any direction. For such a magic conveyance the Englishman gives the name *lift*; but for the operator and all the rest of us, it is an *elevator*. No matter how differently the two words appear both apply equally well to this modern convenience which so rapidly takes us upwards sometimes almost to the clouds. Neither is there any particular difficulty in dissolving these word differences into complete understanding both for the Englishman and ourselves.

There are nevertheless many semantic differences, in our everyday life as well as in the class room and the laboratory that are not so easily reconciled and which *can* and often *do* create serious misunderstanding and confusion. Anyone who has taught biology or botany to collegians, particularly, during the last decade or so, will readily recall some of the numerous word difficulties. Taxonomists, as specialists, have done much to unify and clarify that part of terminology which has to do with the identification of plant species themselves; whereas the adjustments of the language from which the student should be helped to learn about these plants have not kept pace with the growth of botanical science itself.

The reasons for the adoption of the

original botanical terms, many of which now have only an historic significance can be satisfactorily understood only by one who has a fair knowledge of the classical languages and who is also familiar with the history of the development of these sciences throughout the centuries. The terminology is a mintage from the alloy of the classical languages which has been amplified and expanded from time to time according as new discoveries were made. But, unfortunately, the co-ordination of the language of botany which should parallel the advances in the science itself have lagged far behind. It seems too that many of our botanical forbears had a penchant for coining words and multiplying terminology so that we, as their followers, find ourselves saddled with a lot of excess terminology which no longer serves any good purpose.

No one of us here, I presume, is by profession a teacher of language. Neither should it be necessary for any of us as teachers of botany to devote any undue time or effort in this area. Strictly speaking, much can be learned about plants without a complete knowledge of the intricacies of terminology, particularly in the important fields of physiology and ecology. But for the professional botanist, the scholarly scientist, the lack of an adequate knowledge of the official language of his subject raises an almost insurmountable barrier between him and the history of his science and makes a decisive block to easy reading and a keen, comprehensive understanding of its present progress.

What of the numerous college and university students who really have a desire to learn something of plant life in its aesthetic as well as its practical applications but whose major interests are far from the science of plants as such. Too often these students are mystified by the welter of confusing words both new and strange to them, many of which, to put it mildly, are of mixed meaning. Some of the technical words we might reasonably expect them to have to learn *de nouveau*, but the truth is that too many of these classical derivatives in their literal translations are no longer faithful to their present application and meaning. This, of course, is discouraging to the use of a glossary; however helpful it can be in many cases.

Permit me to try to illustrate with only a few of the many very irritating examples from the highest phylum of plants. The term *Spermatophyta* and its anglicized form *spermatophytes* at once present a difference in spelling, another in pronunciation, and, a third, in the use of the initial capital letter — all owing to differences between the purely classical word and its anglicized form. Nevertheless, like many others of similar origin, these two words are often used interchangeably in our botanical literature. Starting with this Greek compound for seed plants, the student learns that the term *Spermatophyta* literally means *seed plants* and, later, he will learn something about a plant seed — a very complex organ which essentially includes a young plant, a seed plant. If not before, at least a little later, the student must learn that the term *sperm* is also applied, generally, to the single cell, the male reproductive cell of both plants and animals. And, according to its origin and specialties (if not for greater confusion) the essential sperm may be called a *spermatozoon*, a *spermatium*, a *spermatozoid*, and even an *antherozoid*.

Just as our anglicized word *spore* comes from the Greek *sporos*, its An-

glo-Saxon equivalent is also *seed*.

It is quite plain that all of these words which literally translate to the English word *seed*, however different in their application, in some measure at least express beginnings or initial stages in the development from a simpler to a more complex or adult form. Thus we speak of the germination of a spore, for example, when we mean the first division of the cell itself and its start on the way to development into a more complex structure. The verb *germinate* applies equally well to several one-celled organs whether spores, zygotes, or parthenogenetic eggs, any one of which by its first division, takes its first step in the development of a more complex individual. It is only when we use the verb *germinate* to describe the escape of the young plant, already well-formed, from the seed coat inside of which it was developed, that its use seems inexact. Because the germination or beginning of this young plant really occurs when the zygote or the parthenogenetic egg from which it developed underwent its first division.

Other complications, some of them more possible to dissolve perhaps, occur in the study of so beautiful a structure as a flower. We might well begin by showing that a flower is really a branch of the plant—a branch which differs from the branch that bears green leaves in that some of the leaves of the flower are usually highly modified and others much specialized. These floral leaves differ from the foliage leaves in their arrangement on the branch, sometimes in their color, and particularly in their forms and functions. It is regrettable that here too there are so many terms, some of which are not only superfluous but also bewildering to the average beginning student. The four types of floral leaves must, of course, be distinguished; but such extra terms as *calyx*, *corolla*, and *perianth* might well be discarded in the interest of simplicity in a beginner's course. Words, too,

like *peduncle*, *pedicel*, *rachis*, when applied to flowering branches, tend to confusion rather than to clarity.

A spade is a spade, whether it be heavy or light, dull or sharp, whether it was designed for the use of a child or that of an adult. Just so are flower *receptacles*, however they may differ from one another in details they are just what they are. Therefore such terms as *torus*, *thalamus*, *hypanthium*, when applied to flower receptacles, are neither more denominative nor more descriptive than the word receptacle itself.

We all have experienced the word jumble which is evident when the terms *epigynous*, *hypogynous* and *perigynous* are introduced. These seem to compete with the *superior* and *inferior* ovaries for first place at the peak of the perplexities that these words create. If one might be simple enough to speak of the position of the so-called ovary as *above* or *below* the insertion of the other floral leaves or, better, to determine whether it issues from a conical, a flat, or a depressed flower receptacle, it seems that the student might then be left free to concentrate on just what happens when this so-called ovary matures into the essential fruit. These important facts, when divested of a lot of extra verbiage are really much more lucid and interesting.

It also seems most unfortunate that the term *pistil* was ever used to replace the word *carpel* or sometimes to be used as its synonym. On the other hand, the term *carpel*, whether simple or compound, single or one of many in the same flower, seems to have been fairly well chosen since the major part of it becomes or contributes to the formation of the essential part of the fruit, the Greek word for which is *Karpós*. The word *pistil* is not only superfluous but, as most of you probably have discovered, it is sometimes not distinguished from a gun in the spelling of some of our recent colleagues.

Ovaries and Ovules

But the real tug-of-war begins when we examine the inside of the highly specialized leaf or leaves which make up the carpels, whether simple or compound. Some of the most inappropriate words in the whole labyrinth of botanical terminology are the two words *ovary* and *ovule*. When these are compared with their literal meanings and the corresponding use of the terms *ovary* and *ovum* as these apply to animals, they might well be considered the worst of the many vexatious verbalisms. The so-called ovaries in plants bear the so-called ovules. The ovules, literally, little eggs, are really complex organs which, for purposes of comparative morphogenesis, may be considered, in their essentials, both homologous and analogous with the megasporangia of the heterosporous ferns and the gymnosperms. This is true also of the microsporangia of these groups. It is only logical then to reduce the terminology to a common denominator wherever this is feasible. But it is evident that in the field of morphology, particularly, there is a great discrepancy between the precision of the terminology and the progress in the science itself. This makes unnecessary difficulties in an effort to follow the probable lines of evolution between the fern plants and the seed plants, for example.

Gymnosperms and Angiosperms

A real comparison of the morphology of the gymnosperms and the angiosperms is usually not undertaken, I believe, until the misnomers which cling to the flowering plants have been presented. The literal distinction between the gymnosperms and the angiosperms purports to be on the basis of the manner in which each group bears its seeds. In the angiosperms the seed-bearing leaves, the megasporophylls, are called *carpels*. These specialized floral leaves are folded so as to form a vessel which is often confined to the basal region only. Thus the angiosperms enclose their seeds in

a vessel, *angeion* in Greek. This condition contrasts with the gymnosperms, literally, *naked seeds*. These plants bear their seeds on megasporophylls which do not fold to form a vessel or ovary so-called. And since the developed vessel is the essential part of a fruit, in the restricted botanical sense of this term, the megasporophylls of the gymnosperms may not consistently be called *carpels* although some contemporary authors distinguish the seed-bearing cones of the pines, for example, as *carpellate*. I do not believe however that these authors would call the seed-bearing strobilus of any gymnosperm a fruit. Likewise, since the term *stamen* applies to the filament of a floral microsporophyll, the adjective *staminate* when applied to the pollen-bearing cones of gymnosperms is again inaccurate.

At any rate the literal distinction between the angiosperms and gymnosperms, that it, *vessel* and *naked*, is quite inexact because these words are in no sense real antonyms. And this kind of inconsistency is a stumbling block for the student who may give serious attention to the literal meanings of words which are supposed to express a contrast. Quite logically enough, too, he usually comes up with the answer that the seeds of the gymnosperms are said to be naked or uncovered because they do not have a seed coat. The truth is nevertheless that, by-and-large, the seed coat of the average gymnosperm is more formidable and protective than that of the average angiosperm, no doubt for the very reason of its being borne outside a vessel.

Thus it seems in order to prevent backfire, we are obliged on occasion to explain away the literal meanings of many technical words and somehow adjust them to the now and here — to a period in our American culture when the young student is too often most uncertain of the spelling of many of the words in the vocabulary of his everyday life, not to say

anything about classical derivations, their etymology, syntax, and other grammatical details which might make the reading of any college text not only possible but fairly facile.

Berries and Nuts

There are other words which the semanticist calls "weasel words" because they have so many different applications as finally to have no definitely scientific meaning. The terms *berry* and *nut* are both simple, apparently harmless words which might fit into this category. Most people, including the housewife and the fruit vender, generally call almost any small, juicy fruit a *berry*, without the slightest suspicion that the botanist, a stranger to most of them, might have a more restricted or sometimes a very different application for this common little word. In fact, some of the botanist's best examples of the *berry* include the tomato, the grape, and the mayapple; whereas the strawberry, the raspberry, and the mulberry, all of which bear very different types of fruit structures, and none of which are berries in the botanical sense, are only *some* of the berries which are *not* berries in the botanical laboratory. This does not mean that we think the botanist should go along with the cook and the canner in these matters; but since the generality of mankind will not go along with the botanist, it seems that the latter, when he chooses a term of purposes of distinction, should pick one that will distinguish and not confuse.

Coconuts, peanuts, and horsechestnuts are all here to stay. All of these plants are quite distinct in their fruit structures. They agree in one respect, however, and that is in spite of the common names, none of them bear *nut* fruits, according to the botanist's definition of the term *nut*. On the other hand, for a common example of the *nut fruit*, the botanist frequently gives the acorn, which is a name so permanently entrenched in Anglo-Saxon lore that it would be nothing

less than affectation to refer to it in ordinary parlance, at least, as the *oak fruit* or the *oak nut*.

And thus we might continue almost indefinitely only to point out more and more inaccuracies, inconsistencies and other vexatious verablisms which seem to be time-honored hang-overs in most of the general textbooks (my own included). But I must be content only to recall these few illustrations of the language difficulties which all of you as teachers of botany already know.

What can be done about it? I do not propose an answer. Only I do hope that I may have re-aroused the irritation which most of you, no doubt have already experienced in your teaching, if not previously as students. I would hope also that your reaction

to this irritation might serve as a challenge to some of the alert minds and courageous souls among you to dip your pens into fresh ink that would spell out the kind of textbook we need at the present time. This, it seems to me, can be done only by ignoring much of the outmoded terminology, and by sloughing off many of the verbal barnacles which have so long clung to the hull of our botanical ship. The present need is for a beginner's text written in clear-cut, scientific language which will help to solve problems rather than to multiply them. Certainly the need for such a reform seems amply demonstrated in this period of our civilization when, in our colleges, such scientific marvels as atomic energy, television, aircraft and radar must be reconciled with courses in remedial reading!

FAMOUS SCIENCE PUBLISHER DIES

(From *The New York Times*,
15 April 1954)

Alfred Hafner, former head of G. E. Stechert & Co., booksellers of 31 East Tenth Street, died Tuesday at his residence near Zurich, Switzerland, where he had lived since his retirement in 1949. His age was 88.

The successor to the founder of the company, which he joined in 1889 after his arrival from Switzerland, Mr. Hafner became sole owner in 1914. He formed a partnership with his sons, Walter A. Hafner of Darien, Conn., and Otto H. Hafner of this city in 1926. The firm name was changed to Stechert-Hafner in 1946, with Mr. Hafner as vice president.

Under Mr. Hafner's direction the firm met the increased demands for scientific books and periodicals during the recent period of industrial and technological development. He maintained branch offices in England, France and Germany and had established agencies in many other



THE LEAST OF THESE

By Edward Perry Churchill, Ph. D.
University of South Dakota
Vermillion, So. Dak.

Anthony van Leeuwenhoek was a busy man that morning in 1675. It had rained there in Delft, Holland, a few days before and he must examine with one of his microscopes some of the water left standing about. He had leisure thus to pursue his hobby since his post as "Chamberlain of the Sheriff" (whatever that was) seems to have left him spare time. It should have — the salary was barely \$125 a year. But since his ancestors had been wealthy brewers he was well provided for.

This good fortune enabled Leeuwenhoek to possess over two hundred microscopes. There were all made by his own hands. In the whole world at that time only four or five men were using microscopes, mostly hand-made by themselves. These of Leeuwenhoek were simple microscopes with but a single lens, but these lenses were in many cases of as much as two hundred power magnification and the metal parts were of fine brass or silver. Therefore these microscopes were very precious to him and the objects of great pride.

So this morning he carefully got one of his best instruments out of its case and made ready, quite unaware of the great page in zoological history he was to turn that day. He took (to quote his own words, translated from Dutch to the English of his time) "Rain water, which had stood but a few days in a new earthen pot, glazed blew within." In this water he saw with the aid of his cherished microscope some minute organisms; the first Protozoa ever seen by man, though of course he had no idea what they were.

To continue quoting, "When these *animalcula* or living Atoms did move, they put forth two little horns, continually moving themselves. The place between these two horns was flat, though the rest of the body was roundish, sharpening a little towards the end, where they had a tayl, near four times the length of the whole body, of the thickness, by my Microscope, of a Spider-web; at the end of which appeared a globul, of the bigness of one of those which made up the body; which tayl I could not preceive, even in very clear water, to be moved by them. These little creatures, if they chanced to light upon the least filament or string, of which there are many in water, especially after it has stood some days, they stook (stood) intangled therein, extending their body in a long round, and striving to dis-intangle their tayl; whereby it came to pass, that their whole body lept back towards the globul of the tayl, which then rolled together Serpent-like, and after the manner of Copper-or Iron-wire that having been wound about a stick, and unwound again, retains those windings and turnings."

We know now that Leeuwenhoek was describing for the first time one of the common protozoa; the *Vorticella*. It looks like a tiny thistle blossom on a slender stalk which can contract to resemble a coiled spring. Thus with his single-lens hand-made microscope Leeuwenhoek led the way into a fascinating and important field of Zoology. His can be listed with other humble beginnings — the bicycle-maker Wrights, making their twelve-second flight at Kitty Hawk; Ford and his Lizzie; Bell's telephone

line to the next room. New fields and inventions are where you find them and one spark can fire all Chicago; witness Mrs. O'Leary's cow.

Animals come in assorted dimensions, from elephantine down the scale; Protozoa are the least of these. Least, that is, in size, but only in size; and that is my theme.

When the aforesaid Anthony turned our attention to his "*animalcula*", Man started along the path to a comprehension of the importance of the minute. Consider a gigantic whale; or a man even. They are large and important (they hope). But both are composed of microscopic cells — they would be nowhere without the underlying minutiae — they would not exist.

In a broader sense, then, the Protozoa are vastly more than some 20,000 species of microscopic forms whirling about under the bemused gaze of the specialist in his ivory tower. Protozoa are the *multum in parvo* animals. They are the essence, the magic elixir of being; each one a raw drop of life itself.

Every Protozoan is self-contained; it carries its baggage along and it travels light. Everything is inside. It has to be — a Protozoan is one-celled and that one cell must carry on all the fundamental processes that keep noble Man on his feet, and do all that in an entity one can not see with the unaided eye.

We actually owe a great debt of gratitude to the Protozoa. Protozoa, simple as they are, possess the abilities and instincts necessary for self preservation and reproduction. These faculties are quite worthwhile; in fact they are basic for without them there would have been no animals. Nothing can be accomplished without a vast deal of spade work, as Adam found, once outside Eden. Protozoa did the spade work and showed us the way. They were the first animals on this earth. They met the storms and, buf-

feted by environment, were moulded into Life's pattern which we, perforce, followed. To paraphrase St. Matthew: as Life did it unto the least of these, our minuscule brethern, it has done it unto us.

The Protozoa learned how to move about, eat, digest, excrete, breathe, reproduce themselves; so far as we know even to enjoy themselves — should we envy? In the simple(?) Amoeba, for example, are all life processes — laid out so plainly that we can see them. Under the microscope the unfortunate Amoeba might well blush — one could even see it change its mind if it had one.

Protozoa live in water, a microscopic bit of soft protoplasm would otherwise dry up. A number of species, however, encyst by secreting a cellulose wall about themselves when the water dries up. They can thus weather a dry spell without government aid. The spell once over, like hard-shell Baptists, plenty of water is all they need.

The simplest group of Protozoa in point of structure is the Rhizopoda (root-like feet). Here are included the common Amoeba and its relatives. An Amoeba most nearly resembles a drop of water containing dark granules. It has no definite shape, changing constantly as it moves slowly about. All animals are obliged to have a wall or skin of some sort to keep themselves in and other things out. In large forms this is relatively thick and tough, even when not reinforced by scales or features. In most one-celled animals it is a mere cell wall of just sufficient consistency to keep the Amoeba, we'll say, from "running" like a broken egg. Such a delicate membrane can not stand hard knocks, such as a wild pitch for example, but an Amoeba does not play baseball. Its skin is plenty good for an Amoeba; Protozoa know their place and leave the rough stuff to the bigger (we won't say better) animals that drive cars and perhaps vote.

Some Protozoa, though, not to be outdone perhaps, do have shells in which to live. Certain species of Rhizopoda secrete a discoid shell of chitin with a central hole for communication with the outside world. Another makes from chitin and minute sand grains a shell shaped like an old-fashioned soap kettle with several spines were the kettle legs would be. Still a third, the Foraminifera, manufacture a calcareous shell with a number of pores leading to the outside.

The Foraminifera are the hand maidens of the Professor. From the Calcareous shells comes our chalk and what is a Professor without chalk on his elbows? Recalling that the Foraminifera are microscopic in size, how many of them must have died and left shells enough to provide the chalk for just one short lecture (judged by the Professor's watch). Then try to imagine how many to make the chalk cliffs of the world. Cliffs such as form the bulwarks of Old Albion — the white cliffs of Dover, where the blue-birds fared much better than Napoleon or Hitler. Has a system of mathematics ever been devised that can cope with such an immensity in numbers?

Most species of Protozoa, however, do not make shells; they escape danger mainly by their size, or lack of it. A Protozoan can hide in any cranny and how can you slug anything too small to see? And while many may be drunk in with the water by larger animals, there are plenty left and one doubts if an Amoeba grieves long for vanished relatives or companions.

In the matter of locomotion our friends are quite versatile; they have at least three easy methods. The Amoeba group uses one that is simplicity itself, it seems as if it had been borrowed from the water drop that animal resembles. The Amoeba causes a tongue-like projection, a pseudopod, to extend in the desired direction and the content of the cell flows through this structure and behold, the Amoeba is going places. Poor Man has to use a

key (late at night often), but the Amoeba would only need to shove a pseudopod through the keyhole, flow through it and be on the hall carpet. Are size and mechanics any advantage here?

The Ciliates, the Paramecium and its cousins (more cousins than the storied Southern belle), progress by the beating of tiny permanent protoplasmic cilia on the surface of the cell. These beat in either direction without shifting of gears; true Powerglide was built into the Ciliates without extra cost millions of years before Chevrolet was ever heard of; the Paramecium can even reverse without working a lever — can your car do that?

The Ciliates have a fixed shape, the Paramecium resembling a stubby cigar; other kinds have varying forms. Some are oval or almost spherical, some trumpet shaped (fittingly termed Stentors), while others are flattened, with cilia on the lower side where they act in the manner of legs. Leeuwenhoek's Vorticella, it was noted earlier, resembles a thistle blossom. The body wall of the Ciliates is flexible so they can twist around among their fellows, the debris and whatever they may encounter.

A third means of getting about consists in whipping the water with one or more long flagella attached at the anterior end of the organism. One large group of Protozoa uses this scheme. These are the Mastigophora or whip-bearers. The Euglena is a common example. Most of the Mastigophora are cigar-shaped or oval and are green in color.

Think how convenient and economical these little fellows have it; small, of little weight, their propellers self-produced and always on hand so the animal can whirl about through the water instantly, in any direction. Being so small and soft-bodied, there are no traffic injuries. They can not hurt or be hurt, any more than a lot of partly filled hot water bottles shaken up in a tub of water.

Does the high cost of living concern Protozoa? Not at all. The *Amoeba* calmly engulfs microscopic plants and animals of any sort with no problem of preparation at all; a great saving in cost of cook books or can openers. Pseudopods are thrust around the object and it is taken directly through the cell wall. Some water accompanies it and forms a bubble-like food vacuole, a sort of temporary stomach. If the *Amoeba* is feeding actively there may be several such stomachs; small boys take note. Enzymes from the protoplasm of the cell digest the food in the vacuoles. The undigested portions are cast out through the cell wall just anywhere.

The water from the vacuoles gathers up the waste nitrogenous products (urea) and collects in a contractible vacuole. This shortly moves to the cell wall and discharges into the surrounding water. Respiration is accomplished by the exchange of oxygen and carbon dioxide through the cell wall; there is no throat to get sore or nose to run with a cold.

Here in the *Amoeba* we see the fundamental physiological processes at their simplest; possible only in a liquid environment. Only in such a medium could a bit of unprotected protoplasm survive desiccation and move about. Here it can retain a skin thin enough to admit food without the mechanism of mouth or teeth. It can breathe directly through the cell wall.

How potent the need of adaptation to the environment; the animal must live to tell the tale. But that is but one side of the shield. Becoming adapted to the environment is but a means to an end; life does that merely to exist while on its way to the goal. The battle with environment is incidental. In the same water with the simplest Protozoan, as an *Amoeba*, are its more complex cousins and the vastly more complicated many celled worms, crustaceans, fish and whales. Animals are ever reaching beyond their immediate adaptation. When an ani-

mal has beaten one environment, it moves on to another; from water to land, to air — who knows what may lie in the fourth dimension? Do we know the ultimate capacity of Man?

Certain of the Protozoa themselves have started on the road to — glory, shall we say? The Ciliates, as the *Paramecium*, besides having the specialized propelling cilia, possess a definite mouth opening and gullet down which cilia drive their food, harmless bacteria mostly. There is no alimentary canal, the food being digested in vacuoles, but the undigested material is thrown out at a fixed point where a temporary opening appears when needed. There are also minute sacs just beneath the cell wall which when irritated discharge jets of thickened liquid to fend off small attackers.

The whip-bearers mentioned earlier, as the *Euglena*, had a wonderful idea. They were equipped with chlorophyll long before Airwick or toothpaste. This green substance found in most plants enables its possessor to manufacture its own starch food from certain gases and then set to and digest it, a great advantage. *Euglenas* abound in water containing decayed vegetation where much carbon dioxide is being released. In the sunlight the chlorophyll can break down the carbon dioxide and recombine carbon, hydrogen and oxygen to form starch granules in the *Euglena* cell. These it digests. Very simple; if Man could merely pluck a loaf of bread from the air and then proceed to eat it!

But most animals did not follow the *Euglenas* and other *Mastigophora*; perhaps thinking "Who wants to be a vegetable?" Leaders are often left like the church usher who turns at the front of the aisle to find his erstwhile convoy smugly settling into the next to the back pew with an air of great innocence. What a chance the animals missed. The plants have a monopoly on the chlorophyll and animals have to graze, dig (like Adam) or buy their starch. Without green

plants we would starve; perhaps even worse, our rooms and our dogs would not "be so pleasant to be near" and we would not have nice green tooth paste.

There is another group of Protozoa which should be noted as possibly bearing on practices not yet outgrown by even the human kind. These one-celled forms are ball-shaped, attached to something on which they calmly rest and have several sucking tentacles sticking out like pins in a pin cushion. These tentacles stab into the prey and suck up its juices like getting an ice-cream soda through a straw. This group is fittingly called the Suctoria. Pertinent comparisons arising in the reader's mind at this point had best remain there.

The matter of reproduction is very simple to a Protozoan. Its one cell merely divides into two; each half grows to full size and there you have Junior; in fact two of him. No doctor, no hospital or fuss of any kind. But where is Mama? Half of her has been built into each offspring, so it would seem that she is gone. It can be seen why this method has not become popular for higher forms of animals. This cell division is the process by which the first cell of the higher animals increases in numbers to make the adult. The cell divides into two, each of these into two and so on, even to an elephant, whose cells are no larger than those of a mouse, or the single one of a Protozoan for that matter. In the many-celled forms the cells remain together to make a larger animal, thus ensuring greater strength and rendering possible the more abundant life so frequently extolled.

Any cell, including that of a Protozoan, has within itself a rounded body, the nucleus. This seems to be the inner citadel of the cell, the *sine qua non* of life. If an Amoeba is cut in two the part containing the nucleus often lives and rebuilds a normal cell, while the enucleated portion invariably dies. The nucleus contains chro-

matin particles, which are the bearers of heredity, operating even in the humble Amoeba. At every cell division, from Protozoa to Man, the nucleus divides with the cell and half of its chromatin goes to each new cell. The new cells, that is the offspring, will inherit characteristics from the parents.

It is idle to say one does not believe in heredity, though such a statement has been heard. Natural laws are not concerned with whether or not one believes them; they "just keep rollin' along". The fact of heredity is quite obvious. It is what ensures that an Amoeba will produce another Amoeba and not, it may be, a Euglena; that the offspring of a rose is a rose and not, peradventure, a hippopotamus.

Sex is presaged in the Protozoa. Sex is Nature's way of mixing the chromatin of two different strains. In the long run this makes a better general average population. In Protozoa this mixing is accomplished in some varieties by a complete fusion of two individuals, after which cell division proceeds as already described. In other forms, as well illustrated in the Paramecium, two individuals undergo a temporary union during which there is a mutual interchange of some of the nuclear chromatin. In the ensuing cell divisions the new individuals have been found to partake somewhat of the characteristics of both Protozoa involved in the union.

Such pseudo matings occur in Protozoa only at intervals; reproduction by cell division can proceed for many generations without such mixing of chromatin. But every once in a while there occurs this check to keep the population on an even course. We thus find the Protozoa foreshadowing actual sexual reproduction. In higher forms specialization has proceeded to such an extent that there must be a fertilization of the egg by a sperm before reproduction can occur. Thus every offspring produced is a mixture of the two parents. This makes for a gen-

eral intermingling of characteristics so that a population avoids going off into cul-de-sacs.

Have the Protozoa any buttons missing? Consisting of but one cell, they have no brain, nervous system or special sense organs; can they be expected to know anything? An animal must be judged by its capacities; if it has no wings it should not be given zero if it can not fly; if no brain, why expect it to think?

So our answer to "Have they got the buttons?" is that the Protozoa have a few small ones, if you please. Enough and big enough to do for Protozoa; they stay alive, they know how to do that; and being the first animals on earth, the Protozoa have the longest genealogical line in the world. Not so bad, for one cell.

A Protozoan moves in humble walks of life, doing its bit, leaving the large spectacular deeds, as digging canals, building cars, running for Congress, to those with more and bigger buttons, though these may at times be brass. Of course also these larger brothers have stronger arms, bigger heads (how true) and far tougher hides.

First of all a Protozoan can feel. Protoplasm has the intrinsic property of irritability; the ability to react to a stimulus. If a pseudopod, cilium or flagellum touches an object in the water, there will usually be a positive or negative reaction, of greater or less magnitude. The Protozoan will continue to move toward the object, perhaps to swallow it, or withdraw, or, like the Levite, pass by on the other side.

Experiments have shown that Protozoa respond to weak acids by moving away; they may taste the acid or it may merely make the cell wall smart, as it might our skin. Right here we are handicapped, the dumb Protozoan won't tell us. Some Protozoa, as the Amoeba, seem to have a sense of taste, since in experiments they do not ingest bits of glass, while freely taking

food. On the other hand Parameciums have been seen to take in quantities of perfectly tasteless carmine grains; so freely that the animal soon contained a dozen or more bright red food vacuoles. The carmine is quite indigestible and the granules were soon expelled at the temporary opening in the cell wall.

Whether there is a separate olfactory sense in Protozoa can not be ascertained from the experiments. Any material to be noted by the sense of smell has to be in solution in the water so, since there is no nose to turn up, it is impossible to tell whether the animal is responding to taste or smell. Neither is there any evidence that these forms possess any more power to hear than little Johnny at thirty minutes to school time in the morning. Johnny moreover may sense certain vibration of stairs and bed from Mother's approaching footsteps, but little Protzy is not able to do that so far as we know.

Light brings distinct reactions in some varieties. All forms, as the Euglena and relatives, that went over to chlorophyll to get the jump on Airwick, are attracted to light. They collect on the side of the culture dish nearest the light and make up part of the green scum one sees on stagnant pools. When we recall that chlorophyll acts only in sunlight to prepare the dinner, and see under the microscope droves of Euglenas streaking across the field of vision to the light, we realize what is cooking.

Temperature affects Protozoa markedly. When we say "That wind blows clear through me even with my overcoat on", only think of the poor Amoeba, just one thin clear blob of protoplasm, out there in not even a pair of shorts, the water around it down to practically the freezing point; yes, think of it, it can't put its head under its wing.

But you are better men than we are, Protozoa. Protozoa can live all winter in this near freezing water. Their

movements are slowed down, the cilia hardly beat, but they pull through to warm weather and start all over again multiplying by dividing. High temperatures rouse them to greater activity, cilia beat faster and all processes are speeded up. If in experiments the water is heated to an excessive point, they dash wildly about, much as we do when in hot water. They give every appearance of suffering.

In these various reactions the cell as a whole is taking part. In many-celled forms, special elongated nerve cells have developed to conduct impulses from here to there. But this is unnecessary in Protozoa. There is only one microscopic cell and the "here" is so near the "there" that no problem exists. A Protozoan has no nerves, which may be an advantage. None has ever been heard to complain of being "so nervous".

Protozoa, having no brain, can not be expected to rate high in reasoning power or intelligence. In fact their I. Q. would probably best be expressed in what the mathematicians mysteriously term "imaginary numbers". In perhaps the only experiment bearing on the matter, the investigator claimed that his pet Parameciums learned to twist themselves and turn around

while confined in close-fitting glass tubes. His critics, however, objected that, far from learning to turn, the hapless Protozoa merely lost sufficient girth from the confinement in the tubes to give them room to turn around.

It seems evident that Protozoa have not progressed beyond the possession of the rather mechanical abilities and instincts just discussed. These are however basic to all ventures into the realms of the higher forms. Protozoa devised the fundamental processes which enable animals made of protoplasm to survive the storms of the environment. They discovered the laws of life and passed them on to us.

Man did not spring full-panoplied from the brow of Jove. Even he had to arise from small beginnings and build up, adding here a little and there a little. "Many mickles make a muckle" runs the old Scotch proverb. It is to our credit that we added a cap-sheaf of brain but we must not let it go to our heads. "Why should the spirit of mortal be proud?" We came from origins that were humble and mayhap on the wrong side of the tracks. What a miracle it has been that Man rose from obscurity to his present position.

ALPHA IOTAN STUDIES OVERSEAS

(From the *Trident*
of Delta Delta Delta)

Four members of Delta Delta Delta are studying abroad as Rotary Foundation Fellows for 1953-54. They are among 101 outstanding graduate students from 32 countries to receive grants this year from the world-wide service club.

Elizabeth Anne Gibson, *Bucknell*, is studying biology at the University of Paris in preparation for work in the experimental biology field. She was president of her chapter of *Phi*

Sigma, national honorary biology society, was a member of the Women's Student Government Association, and served on the staff of the yearbook.

The Rotary Fellowships are unique in that the student is in direct contact with Rotarians and their families during his year away from home, no matter where he is studying. He attends Rotary meetings, visits in their homes and places of business, and travels as much as possible during his school holidays. In this way, he sees at first hand how the people in his host country live; and, through these close associations, he lays the essentials for increased international understanding.

CONTRIBUTIONS OF STUDENT RESEARCH TO STUDIES ON TRAUMATIC SHOCK

By R. L. de Luise
University of Denver
Denver, Colo.

With the increase of automobile accidents on the nation's highways and byways, more and more of our citizens are being subjected to experiences which often do not end with the collision of two automobiles or of a vehicle against concrete; unfortunately, the aftermath is often manifested in a condition termed traumatic shock. In scientific circles this state has only the connotation of several symptoms resulting from the grinding, mashing, or macerating of animal tissue, accomplished by automobile accidents, gunshot wounds, and the like. These symptoms become apparent in stages: In the first or initial stage occurring immediately after the accident, there appears extreme prostration, clamminess of skin, perspiration, and fall of blood pressure. To these symptoms there is added in the second or intermediate stage a depression of general body functions such as metabolism, digestion, and respiration to mention a few. When a victim or experimental animal has progressed well into this stage, his life begins to ebb slowly until a cloud of death completely enshrouds him and in the terminal stage of shock snuffs out what spark of life remains. The third or terminal stage of shock, into which the intermediate stage progresses, as well as a good portion of the second stage, is beyond worldly explanation at the present time; if the second and third stages could be understood, the lives of many people might be prolonged or even saved.

Since the description of traumatic shock by Paget immediately follow-

ing the Crimean War in 1860, much investigation has been carried out by such noted experimenters as Blalock, Henderson, Paget himself, Wiggers and many, many others. From the data accumulated by these investigators, a multitude of theories attempting to explain shock syndrome have evolved; however, at the present time only three are tenable and are currently receiving much study.

One of these, the Neurogenic Theory, holds that certain nerve endings at the site of trauma are stimulated and reflexly cause arterioles and capillaries to become engorged with blood. This "pooling" of blood effectively removes it from the circulating volume. In passing, however, it must be noted that much data on the subject of the shock syndrome cannot be explained by this theory. The second, or Fluid Loss Theory, proposes two possible means by which plasma may be lost from the circulation: The first by an actual transudation of the plasma through the capillary walls into the surrounding tissue; the second by capillary dilatation and "pooling" probably in the splanchnic area. That the former possibility does occur there is little doubt, for at the site of trauma such leakage does take place, but there is no acceptable proof that it occurs elsewhere in the body. The second possibility to be sure cannot be excluded; however, as the cause of death is explained by neither the Neurogenic Theory nor by loss of plasma through the capillary walls. The third theory is the Humeral or Toxemia Theory which in essence states that at the site

of trauma there is liberated a substance X which is absorbed into the blood stream and thus is distributed throughout the body affecting general body functions by inhibition or suppression. There is considerable evidence supporting the last theory; for example, the use of a tourniquet preventing the return of venous blood from the site of injury is said to postpone shock. This contention is supported by the work of an investigator who demonstrated that injury to a dog's hind leg did not produce shock as long as the returning blood vessels were ligated, even though the nerve supply remained intact.

It is the author's contention that no one of the above mechanisms is responsible per se for the shock syndrome; rather, there is an interaction of the three ultimately terminating in death.

Under the direction and inspiration of Professor Fred E. D'Amour, and with the financial support of the Office of Naval Research, a program of studies on traumatic shock has been in progress at the University of Denver since early in 1946. Many of the contributions to this program have been those of students working for the M. S. degree; some of these students have gone on to continue their work on shock at the University of Colorado School of Medicine under the direction of Professor Donn Smith. Without exception they have been members of Phi Sigma. Although individual contributions may seem small in such a complex problem, definite progress has been made over a period of relatively few years.

The first steps were those of devising a standard method of inflicting trauma on experimental animals and the establishment of criteria to be used in determining the condition of the animal. The specific results of this work of Professors D'Amour, Smith and Blood and Mr. Williamson are to be found elsewhere (1). Mr. Irvin

Kibbey studied the basal metabolic rate in the traumatized animal and found a gradient from normal to subnormal with the progression of irreversible shock (2). This has raised the question of the rationale concerned. Mr. Jay Wells, who was interested in the Fluid Loss Theory, observed that the reduction of blood volume alone could not cause shock, for transfusions in general had no beneficial effects (3). Mr. Harvey Brown has adduced certain evidence in support of the Toxemia Theory (4). Extract of traumatized tissue (cecum) injected into the ceca of normal animals brought about certain manifestations of shock. Professors D'Amour and Smith found that ACTH somewhat increased the life expectancy of certain percentages of shocked animals (5).

Although many questions concerning the etiology and the treatment of shock remain a mystery, it is hoped that further studies of this type may lead to some of the answers. It is further hoped that this will illustrate the value of the individual contributions of student research to a larger, long-term research program.

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- 1 Smith, Donn L., Warren J. Williamson, Frank R. Blood, and Fred E. D'Amour. 1951, *American Journal of Physiology*, 165:532.
 - 2 Kibbey, I. V., 1952, *Journal of the Colorado-Wyoming Academy of Science*, 4:94.
 - 3 Wells, J. W., 1952, *Journal of the Colorado-Wyoming Academy of Science*, 4:94.
 - 4 Brown, H. W., 1952, "Toxic Factors in the Traumatized Tissue of the Albino Rat." *Journal of the Colorado-Wyoming Academy of Science*, 4:94.
 - 5 Smith, Donn L. and Fred E. D'Amour, 1952, *Journal of Pharmacology and Experimental Therapeutics*, 106:4.

BILHARZIASIS IN EGYPT

By Dr. Henry vander Schalie

University of Michigan

(Dr. Henry van der Schalie, malacologist* and expert adviser for the World Health Organization to the Government of Egypt, has been working on the new Bilharziasis Control Project in the Qualioub District while on leave of absence from the University of Michigan, Ann Arbor, Michigan, U.S.A., where he is Associate Professor of Zoology and Curator of Molluscs in the Museum of Zoology, a research museum. A distinguished scholar, Dr. van der Schalie specializes in snails and conchology and is thus particularly fitted for his role in helping to eliminate, in the experimental area, the snails that carry dread bilharziasis.)

The most serious and ruinous disease in Egypt today is bilharziasis. The deaths, the suffering and the loss of productive power that it causes are almost unbelievable.

More than half the people of Egypt are afflicted with one of the two forms of bilharziasis that are known there, many from both. The deaths it causes cannot be counted, since it weakens the individual so that he is a prey for any infection that comes along. Medical authorities estimate, for example, that bilharziasis is responsible for one out of every five deaths in the country.

Moreover, the economic cost is staggering. It was estimated by the late Dr. M. Khalil, in the Journal of the Egyptian Medical Association (November and December 1949) that bilharziasis causes a loss of £E 80,000,000 yearly to Egypt, if one con-

siders the loss of production, manpower and the cost of health services.

People in all walks of life are afflicted but the fellahin suffer most, since they are in daily contact with the millions of kilometres of canals and drains inhabited by the two varieties of snails, *Bulinus truncatus* and *Planorbis boissyi* which are carriers of the disease. The eggs of the parasite are deposited in the water by the sick fellah who pollutes the canal. They find a host in the snail which, after a suitable period, produces the infective larvae, called cerceriae, in tremendous numbers.

Anyone who washes or bathes in this water is in constant danger that the cerceriae will attach themselves to his skin and bore into his body. There they develop into worms which make and produce eggs which may lodge in any part of the body, especially in the bladder and the intestines, — causing the familiar symptoms of haematuria (discharge of blood in the urine), enlargement of the spleen, anaemia and general bodily and mental deterioration.

The sick man unconsciously saves himself by adjusting his work output to his lowered physical strength. But if the fellah should be subjected to heavier labour his physiological balance breaks down and aggravated symptoms of bilharziasis suddenly appear.

It is ironical that it should be his close association with the irrigation waters, the source of his livelihood, that exposes the fellah to this devastating disease. It has always been so. Bilharziasis was perfectly described in a papyrus of 4,000 years ago and traces of the worm have been discov-

*Malacologist — a student of molluscs.

ered in mummified remains. Equally ironical is the fact that in modern times, the damming of the Nile, on which Egypt's prosperity depends, has increased the danger of bilharziasis since the snails live and breed more profusely in the almost continual supply of stagnant or sluggish water.

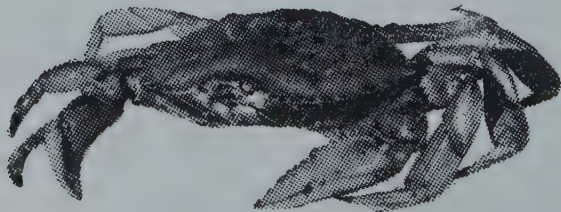
For many years, the Egyptian government has been working on bilharziasis control both by treating the sick and by destroying the snails that are essential in the life cycle of the parasite worm. There are also special units of the Ministry of Health for the improvement of sanitation and for health education. The experience of these various sections have been of great value and other countries look to Egypt for help when planning anti-bilharziasis campaigns.

The newest effort to control bilharziasis is also an effort of the Ministry of Health with the collaboration of the World Health Organization which is contributing experts and money for essential equipment that must be purchased abroad. This project involves a special tract of land within the Qualioub Health Demonstration Area, which has been selected as an experimental zone. All the most modern methods of bilharziasis control will be co-ordinated in a concentrated attack. The snail carriers will be destroyed, sanitary measures will be introduced

to provide good water and proper disposal of sewage, persons who are infected will be treated, health education will be given to help the people to appreciate the value of treatment and to gain their co-operation in the proper execution of the plan.

The object of all this is to see what results can be obtained by focussing all known methods of control on one area. For treatment is no use unless people can be taught to avoid polluting the canals; pollution can be made far less dangerous if we can kill the snails that transmit the disease. Perhaps most important of all is to have a well-informed public, and everyone can help in this. Schools, newspapers, health organizations, in fact every known method of public education can be used to inform people how bilharziasis is contracted and how to avoid it.

This concentrated plan offers hope not only to the more than 10,000,000 people who are suffering from bilharziasis in Egypt, but to the hundreds of millions throughout the world who are exposed to its ravages. For this project will not remain an isolated attempt to wipe out the disease; its lessons will be applied throughout the world wherever governments and the WHO can find the money and the necessary personnel to organize the fight.



NEW BOOKS

This section offers brief, mostly uncritical reports on the general content of recent publications in biological and related fields. Only the longer critical reviews will be signed. For quick location on library shelves, each notice will be preceded, wherever possible, by three groups of numbers, the first two of which will be the Dewey and the Library of Congress classified numbers respectively. The third group is the L.C. card number, for the convenience of Librarians.

ACANTHOCEPHALA OF NORTH AMERICAN MAMMALS, by Harley J. Van Cleave; University of Illinois Press, Urbana, Ill., 1953. 179 pp., 470 illus.

53-5226

This was the last work to come from the pen of our late Honorary President of Phi Sigma. It deals with the thorny-headed parasitic worms which up to now have been in such a chaotic position taxonomically that Dr. Van Cleave refrained from publishing anything about his forty-year research project. In this posthumous work we have the last word on the subject in many ways.

ADAPTATION IN MICRO-ORGANISMS, ed. by E. F. Gale and R. Davies; Cambridge University Press, 32 E. 57th St., New York 22, N. Y. 1953, 339 pp., figs., tab. \$6.00

Fifteen papers were read at the Third Symposium of the Society for General Microbiology held at the Royal Institution, London, April 1953. Twelve deal with bacteria, the last three with adaptations in *Paramecium*, *Thermophilus*, and *Fungi*. The contributory comments by the other 31 members present enhance the value of this collection of research papers. It lacks an index.

ADVANCES IN ENZYMOLOGY, Vol. 14, edited by F. F. Nord; Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 1953. 470 pp., figs., illus. and tables. \$9.25.

41-9213

Contains "Probleme des Energie-transporte innerhalb lebender Zellen" by Theodor van Bucher, of Hamburg; "Pantetheine and Related Forms of the *Lactobacillus bulgaricus* Factor" by E. E. Snell and G. M. Brown of Texas; "Metabolism of Phenylalanine and Tyrosine" by A. B. Lerner of Oregon; "Oxidation of Proteins by Tyrosine and Peroxidase" by I. W. Sizer of Massachusetts; "Chemismus der Organischen Katalyse" by W. Langenbeck of Halle Salle; "Enzymic Isomerization and Related Processes," by L. F. Leloir, Buenos Aires; "Suggestions for a More Rational Classification and Nomenclature of Enzymes" by O. Hoffman-Ostenhoff, Vienna; "Quelques Techniques nouvelles pour l'Etude de la Structure des Proteines" by P. Desnuelle, Marseille; "Adsorption Studies of Enzymes and Other Proteins" by C. A. Zittle, Philadelphia; and "Principles and Pro-

cedures in the Isolation of Enzymes" by S. Schwimmer and A. B. Pardee, California. This book is well indexed.

ADVANCES IN GENETICS, ed. by M. Demerec; Academic Press Inc., 125 East 23rd St., New York 10, N. Y., 1953. 331 pp., figs., illus., tables. \$8.50

Six papers, "Population Dynamics of Rodents, etc." by W. F. Blair, Texas; "Genetics of Polymorphism in the Lepidoptera" by E. B. Ford, Oxford; "Inheritance in Bacteriophage" by A. D. Hershey, Cold Spring Harbor; "Biochemical Genetics of *Bombyx mori* (Silkworm)" by H. Kikkawa, Osaka; "Genetics of *Aspergillus nidulans*" by G. Pontecorvo, Glasgow; and "Genetics of the Silkworm, *Bombyx mori*" by Yoshimaro Tanaka, Misima. This book is also indexed by authors and subjects.

ANIMAL BIOCHROMES AND STRUCTURAL COLOURS, by Denis L. Fox; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1953. 379 pp., 37 figs., 49 formulae, 11 tables, 3 color plates. \$11.00.

Twenty-seven pages of references would seem to justify the author's modest opening statement that "the chromatology of living organisms is an expanding realm." This book aims to survey that realm, giving a preliminary study of animal coloration, the Tyndall and Diffraction Colors, Iridescent Colors, and ends with eight chapters on the various pigments.

ANATOMY AND PHYSIOLOGY LABORATORY MANUAL, by A. W. Glass and C. Hamrun; W. B. Saunders Co., Philadelphia, Pa., 1953, 57 pp., 84 figs. \$1.50

Gustavus Adolphus Biology Department's one-semester course outline which will be helpful wherever such a course is offered.

ANIMALS AND MAN, by G. S. Cansdale, Frederick A. Praeger Inc., 105 West 40th St., New York 18, N.Y., 1953. 200 pp., 55 illus. \$4.00

53-5306

The author of this attractive book is Superintendent of the London Zoo. His book covers animal conservation, foreign animal introduction, animals in man's service, and other associations between animals and man. The tone of this book, its judicious admixture of new facts and common sense commend it.

ANIMAL MICROLOGY by Michael F. Guyer (with the Chapter on Drawing by Elizabeth A. Bean); University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill., 1953. 327 pp., 76 figs., 3 appendices, \$4.75

Completely revised, this veteran textbook should continue for many more years to hold its place among the other books on the subject as successfully as it has in the past. The famous "Appendix C" has been brought up-to-date.

OUR ANIMAL NEIGHBORS, by Alan Devoe and Mary B. Devoe; Frank A. Praeger Inc., 105 West 40th St., New York 18, N.Y. 1953, 278 pp., 13 figs., \$3.75

53-5185

Two naturalists give engaging descriptions of their animal neighbors on an old Berkshire Hills farmstead. Informal studies of woodchucks, muskrats, white footed mice, deer, cottontails, fox, skunks, make up the main part of the book.

THE ANTARCTIC TODAY, ed. by Frank A. Simpson; W. S. Heinman, 400 East 72nd St., New York 21, N.Y. 1952. 389 pp., 45 plates, pocketed map of South Polar regions, \$6.00

This book published by the New Zealand Antarctic Society comes close to being the official and authentic printed reference on the south polar regions. Each of the 18 chapters is the work of a specialist in the field discussed.

THE ANT WORLD, by Derek W. Morley; Penguin Books Inc., 3300 Clipper Mill Rd., Baltimore 11, Md., 1953. 191 pp., 14 ill.

This is another of the well edited Penguin series. It covers the evolution, behavior, varieties and the organization of ant groups.

APPLIED ELECTRON MICROSCOPY, by Robert B. Fischer; Indiana University Press, Bloomington, Indiana, 1953, 234 pp., ill., diagr.

Dr. Fischer is associate professor of Chemistry at the University of Indiana. His book is designed to help those students who are fortunate enough to be working at an institution which is equipped with an electron microscope. The theory of electron microscopy as well as its techniques are thoroughly covered.

ATLAS OF THE SCALE INSECTS OF NORTH AMERICA, Vol. VI, by G. F. Ferris; Stanford University Press, Stanford, Cal., 1953, 506 pp., 193 figs., \$7.50

37-4591

This sixth volume in the comprehensive series on the scale insects emanating from Stanford is devoted to the second part of the Pseudococcaceae and completes as much of the group as will be covered in the Atlas. The index, therefore, covers all the material presented in the fifth as well as this sixth volume.

—B—

BACTERIAL GENETICS, by Werner Braun; W. B. Saunders Co., Philadelphia, Pa., 1953, 238 pp., 67 figs., \$6.50

The arrival of this book drove us back to Manwaring's paper on "Environmental Transformation of Bacteria," in *Science*, Vol. 74, pp. 466-470. It is worth re-reading in connection with the present work. The twenty years that have past, and the potential importance of Dr. Braun's discussion, excellent though it is, is still, from the aspect of bacteriological warfare, disquieting, especially since Dr. Braun says this is a "rapidly expanding field." So is the thermonuclear.

BASIC BACTERIOLOGY, by Carl Lammanna and M. Frank Malette; The Williams and Wilkins Co., Baltimore 2, Md., 1953, 677 pp., 66 tables, 100 figs. \$10.00

Two associate professors at the Johns Hopkins University School of Hygiene and Public Health here present a text-book on the biological and chemical background of bacteria. It is not a new textbook on the morphology and behavior of bacterial strains or disease producing organisms. This is a manual of techniques, theory, methodology, at the intermediate level for graduate research students who will be using bacteria as tools rather than as objectives. Figures 83-86 are reproduced in enlarged form on separate sheets for convenient study without referring to the original page, and stored in a neat pocket under the back cover.

THE BEST OF TWO WORLDS, by Joseph Wood Krutch; William Sloane Associates, 425 Fourth Ave., New York 16, N.Y. 1953, 171 pp., \$3.00

53-9338

The author of 12 philosophical musings on plants, animals and physical nature which make up this very intriguing book used to be Brander Matthews Professor of Dramatic Literature at Columbia University. Much of his earlier writing was along the lines of the purely literary studies which one could have expected from a professor in one of our large universities. Since he has gone over into nature studies his work has taken on a new flavor. With a theater-lover's eye for the dramatic, he is able to catch incidents in the lives of animals that the matter-of-fact observer would probably regard as merely something to be tallied.

BETTER LANDSCAPING, by John H. Melady; Grosset and Dunlap, 1107 Broadway, New York 10, N.Y., 1953, 194 pp., 156 drawings, 16 color pl., \$1.50

There are a lot of other books on applied horticulture, home gardening, and the like, but for the beginner, there aren't any better than this one.

THE BIOCHEMISTRY OF THE NUCLEIC ACIDS, by J. N. Davidson; John Wiley & Sons, Inc. 440 Fourth Ave., New York 16, N.Y., 1953. 200 pp., tables and ill., \$2.25

This is another of those hand-sized Methuen Monographs on Biochemical Subjects. So popular was Dr. Davidson's first work that this second one had to be printed, a popularity that probably sprung from the tremendous amount of information that the author has compacted within such small compass, — a virtue, incidentally, that seems to characterize all the Methuen publications.

BIOLOGICAL CONSERVATION, by John D. Black; The Blakiston Co., 575 Madison Ave., New York 22, N. Y. 1954, 328 pp., 74 figs., \$5.00

This is one of the most intelligently planned textbooks published in recent years. It starts out with basic conservation ideas, including a survey of the work of the fourteen greatest American conservationists. Part two deals with ecological considerations, part three with the species of fish and other aquatic animals concerned, part four is devoted to birds, five to mammals, and six to the solution of conservation problems.

EFFECTS OF EXTERNAL BETA RADIATION, ed. by Raymond E. Zirkle; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y., 1953. 242 pp., ill., charts, tables, \$5.50

The table of contents of this latest publication of the Atomic Energy Commission's Oak Ridge experimental laboratory is buried in the book 23 pages deep, under a stack of no less than six forewords and prefaces. Ten of the sixteen chapters on the various phases of beta radiation have Dr. J. R. Raper as the senior author. His work has dealt mainly with its effects on experimental animals. These lead up to the paper by J. E. Wirth and J. R. Raper on the reactions of human skin to single doses of beta rays. Bibliographies on each chapter are generous as they have been in the previous volume in this valuable series.

BIOLOGICAL TRANSFORMATIONS OF STARCH AND CELLULOSE, ed. by R. T. Williams; Cambridge University Press, 32 East 57th St., New York 22, N.Y., 1953, 84 pp., figs., tables, \$2.25

This 11th symposium report from the London School of Hygiene and Tropical Medicine consists of papers on the biological synthesis of starch, by E. J. Bourne the enzymic breakdown of starch, by W. J. Whelan; starch synthesis and degradation in vivo, by Helen Porter; the chemistry and chemical degradation of cellulose, by G. O. Aspinall; cellulases, by M. V. Tracey; digestion of cellulose by ruminants, by A. T. Phillipson; and the occurrence and prevention of the biological attack of cellulose textile fibers, by R. G. Fargher.

BIOLOGY, by Claude A. Villee; W. A. Saunders Co., Philadelphia, Pa., 1954, 670 pp., 293 figs., \$6.50

54-6088

This second edition of Dr. Villee's book is a lot of volume for its cost. The author aims to present all the facts needed by a student in a college course without being superficial. The book is therefore divided into eight parts as follows: I, protoplasm, cells, tissues, metabolism; II, biological interrelationships, plant cells, seed plant anatomy and physiology, bacteria, algae and fungi, land invasion by plants, evolution in plant reproduction; III, lower invertebrates, higher invertebrates, phylum chordata; IV, blood, circulation, respiration, digestion, metabolism and nutrition, excretion, integumentary and skeletal systems, musculature, nerves, sense organs, endocrines, body defense against infection; V, reproduction, embryology, heredity, genetics, human inheritance; VII, evolution, fossil evidences, living evidences, human evolution; VIII, ecology, adaptation, and a survey of the plant and animal kingdoms.

BIOLOGY, by Paul B. Weisz; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y., 1954, 697 pp., ill., \$6.50

53-8013

Materials for a first course in general biology are developed in an epigenetic manner. The first-level unit discusses fundamentals of biological systems. In the second level these ideas are expanded into chapters, environment, living substance, metabolism and self-perpetuation. These second-level units then make up the sections into which the rest of the book is divided. All of which is presented in language as non-technical as possible. This ought to make this book a "natural" for home-study courses, especially since most of them are taken by people who will go no further in science. For students who intend to major in one or other phase of biology there is an appendix with the classification of plants and animals. We think John Dewey would have liked this book.

BIRD WATCHING, by Joseph J. Hickey; Garden City Books, Garden City, N. Y. 1953, 264 pp., illustrated, \$1.98

The author of this attractive manual is a member of the Department of Wildlife Management at the University of Wisconsin. The fact that the author's inspiration to write the book came from William Vogt, and continued under Aldo Leopold gives it a unique background that should recommend it to bird-lovers anywhere in this country.

THE BOOK OF HEALTH, ed. by R. Lee Clark, Jr., and R. W. Cumley; Elsevier Press Inc., 155 East 82nd St., New York 28, N.Y. 1953, 769 pp., 1400 ill., 20 in color, \$10.00

This book is a far cry from the old-fashioned "doctor book" of the near-ancient '80s. With the collaboration of 242 responsible experts in their fields, it comes close to being what Dr. Boles

in his "Saturday Review of Literature" article called it, "a layman's cyclopedia of medicine." It may conservatively be said that this is the biggest ten dollars' worth of book anyone can buy anywhere in the U. S. A. today. With the recent hysteria regarding atomic war and its possible outbreak, the chapter on physical injuries and first aid is especially opportune, but so also are those on sickness at home, sanitation, and the one on the medical profession.

—C—

CHEMISTRY IN HEALTH AND DISEASE, by Harry C. Biddle; F. A. Davis Co., 1914-16 Cherry St., Philadelphia 3, Pa., 1953, 797 pp., figs., charts, etc. \$4.75

This long-time favorite textbook for the nursing profession has been thoroughly revised with an eye to the needs of students who will want a more complete and extensive training in the field. A laboratory course of forty exercises is incorporated into the text. There are periodic sets of review questions to test the retention of course material by the student. The book gives evidence of many years practical experience in the field of nursing education.

CHEMISTRY, INTRODUCTION TO PHYSIOLOGICAL AND PATHOLOGICAL, by L. Earle Arnow; C. V. Mosby, St. Louis, Mo., 508 pp., 108 figs., 28 tables, \$3.75

This is the fourth edition of a textbook which has been in use at the University of Minnesota Medical School and School of Nursing, and thus represents some fourteen years of practical experience. The author is vice-president and director of research for the Sharpe & Dohme division of Merck & Co. New aspects of this edition which are of timely interest are the treatments of nuclear reactions and atomic energy, the background materials for disaster units in the event of chemical warfare, and the new chapter on blood chemistry.

ELEMENTS OF CHORDATE ANATOMY, by Charles K. Weichert; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y., 1953. 451 pp., 258 ill. \$5.50

Those of us who knew "Chuck" Weichert when he was a graduate student and member of Phi Sigma at the University of Wisconsin have been watching his output of teaching manuals with pleasant interest. His "Anatomy of the Chordates," published three years ago, was an impressive production. It is good to know that he has been prevailed upon to reduce its size, but not its excellence, to one better adapted for a one-semester course. A laboratory manual "Representative Chordates" may be purchased separately.

CYTOLOGY, INTERNATIONAL REVIEW OF, ed. by G. H. Bourne and J. F. Danielli; Academic Press Inc.,

125 E. 23rd St., New York 10, N. Y., 1953, 545 pp., figs., charts & diag. \$11.00

52-5203

Fourteen cytological papers make up this second volume in the series, which cover the following subjects: quantitative aspects of nucleoproteins, ascorbic acid localization in plants, aspects of bacteria as cells, ion secretion in plants, multienzyme sequence in soluble extracts, the Feulgen nuclear reaction, histochemistry of phosphatases, nuclear phosphatase, gustatory and olfactory epithelia, growth and differentiation of explanted tissues, electron microscopy of tissue sections, kinetics of free ion diffusion across membranes under the redox pump, survey of current quantitative histo- and cytochemistry, nucleocytoplasmic relationships in *Acetabularia*.

CLASSIFICATION OF FLOWERING PLANTS, Vols. I and II, by Alfred B. Rendle; Cambridge University Press, 32 E. 57th St., New York 22, N. Y., 1953 and 1952. 412 & 640 pp., 187 & 279 figs. \$7.00 and \$7.50

This is a reprint of the second edition of the first volume, and of the corrected reprinting of the first edition of the second. When the first volume was issued in 1904 "Nature" commented favorably on the author's adoption of the Eichler-Engler classification system as opposed to the long-standing tradition of British botanists in following Bentham and Hooker. For too long Rendle was the only follower of the German system in England.

CLIMATE, VEGETATION AND MAN, by Leonard Hadlow; Philosophical Library, 15 East Fortieth St., New York 16, N.Y., 1953, 288 pp., 84 figs., \$4.75

This is another of those compact, fact-filled British books which are given to youngsters in their schools. The book has three parts, — the foundations of climate, nature's response to climate, and man's response to climate and vegetation. Illustrations are from all over the British dominions and the United States.

CONDUCTIMETRIC ANALYSIS AT RADIO-FREQUENCY, by G. G. Blake; Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. 1952, 126 pp., 40 figs. \$2.75

Amperometric titration, or conductimetric analysis, is here presented in book form with all improvements made by the author since it was first announced before the New South Wales Division of the Australian Branch of the Institute of Physics, at Sydney University on May 13th, 1947. It gives the details for setting up reliable apparatus for carrying out analyses and titrations. The author's radio-frequency methods are rapid and accurate for regular solutions, as well as colloidal solutions with precipitates present and also for microtitration.

SOME CONJUGATED PROTEINS, ed. by William H. Cole; Rutgers Univer-

sity Press, New Brunswick, N. J. 1953
73 pp.

53-11054

Six speakers presented a symposium at Rutgers late in January 1953 on conjugated proteins. Their reports are: The Anatomy of Hemoglobin, by Sam Granick; Cytochromes in the Mammal, by Walter Wainio; The Problem of Nucleoproteins, by Erwin Chargaff; Metabolism of Virus-Infected Bacteria, by Seymour S. Cohen; Lipoproteins, J. L. Oncley; and Mucoproteins and Mucoids, by Karl Meyer.

CRUSTACEOUS CORALLINE ALGAE OF THE PACIFIC COAST, by Lucile R. Mason: University of California Press, Berkeley, al., 1953, 77 pp., 19 pl., \$1.25

Dealing only with the crust-forming red algae of the west coasts of Alaska, Canada and this country, this paper covers but two tribes of the corallines, — the Lithothamnidae, with the genera *Polyporolithon*, *Melobesia*, *Lithothamnion*, and *Clathromorphum*, and the Lithophylidae with genera *Hydrolithon*, *Dermatolithon*, *Heteroderma* and *Lithophyllum*. The author splits four of the old Lithothamnionids off to establish a new genus, *Polyporolithon* and lists species *P. patena*, *P. conchatum*, *P. parvum*, and *P. reclinatum*.

CULTIVATION OF ANIMAL AND PLANT CELLS, by Philip R. White; The Ronald Press Co., 15 East 26th St., New York 10, N.Y. 1954, 239 pp., 54 figs., \$6.00

54-6980

This is not a book on "tissue culture." It deals with the cultivation of cells. The term "tissue culture" has always been a misnomer, as Harrison pointed out long ago. One does not cultivate "tissues." What one does is to cultivate either a group of cells such as those which make up certain "tissues," or an organ, itself made up of "tissues," but never a tissue itself. (The author's words).

—D—

THE DESERT YEAR, by Joseph W. Krutch; William Sloane Associates, 119 West 57th St., New York 19, N. Y. 1952, 270 pp., ill., \$3.75

If the excellent illustrations in this book were only labelled, and if some botanist or zoologist friend of the author would have inserted in neat parentheses the scientific name for each of the plants or animal types he discusses so lucidly, this would be one of the capital biological studies of xerophytic associations of the past few years. The author writes of the desert and its population in the fashion of Thoreau.

DDT AND NEWER PERSISTENT INSECTICIDES, T. F. West and G. A. Campbell Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. 1952, 632 pp., 13 pl., tables, etc. \$8.50
Dichloro-diphenyl-trichlorethane has become so well known since its discov-

ery in 1939 by the Swiss chemist, Dr. Paul Muller, that it is not to be wondered at that the first British edition of this work was snapped up with phenomenal speed. That was in the war years. This is the first American edition of the actual second British edition, which had to be issued to meet the demands of the clamoring public, the medical, military and farming groups. The prologue to the original edition has been retained, with its interesting story of the way in which DDT under the name of Gesarol, Gesapon and Neocid, was smuggled into Britain from neutral Switzerland. Its use by the allied armed forces undoubtedly prevented many epidemics of potentially devastating character when the migration of refugees got under way. This book is a compendium of all the information available on DDT itself. We fail to find anything about house-flies breeding resistance to the poison, nor the slaughter of the Australian Army's bees essential for pollinating their tropical fruits in Dutch Guiana. Paytt two deals with Benzene hexachloride, chlordane, "3956," and other new insecticides. As is usual with Empire publications, and unlike most American reports, the effects are not considered from the locale of the Mother Country only, but from all over the British dominions.

DYNAMICS OF GROWTH PROCESSES, ed. by Edgar J. Boell; Princeton University Press, Princeton, N. J. 1954, 304 pp., figs. & plates. \$7.50

54-6070

This is the report of the 11th symposium on growth conducted in June 1952 at Williams College. Its thirteen papers range from virus reproduction to population growth mathematics, include from ACTH to yeast growth and are considered by such leaders as L. M. Kozloff, A. Novick and L. Szilard, A. W. Pollister, G. Fankhauser, K. R. Porter, D. S. Van Fleet, F. W. Went, F. Skoog, R. Gaunt, W. W. Greulich, D. A. Scholl, G. E. Dickerson and F. E. Smith.

—E—

ECOLOGY, FUNDAMENTALS OF, by Eugene P. Odum; W. B. Saunders Co., West Washington Square, Philadelphia 5, Pa., 1953, 384 pp., 119 figs., \$6.50

53-10484

The next time your Editor gives a course in general ecology, which will be in the fall term of '55 because our advanced courses run in cycles, this is the textbook he is going to use. That is, providing a much better one does not appear from some thus far unknown or unexpected source meanwhile. But, it will have to be a much better book than this, — and that's expecting a lot! It covers the whole field, plants, animals and man, — which in the small college is necessary. It considers the individuals of these three groups as they make up populations in differing environments. It has cut the monkey business of ecology terminology down to the bone. There is no glossary! Terms are listed in the index, and the page on which the definition

appears is bold-faced. Finally, there are only fourteen chapters to the whole book, which should break up into rather adequate sized assignments for a semester's course. For at least one exasperated instructor, this text looks like "something the Doctor ordered."

THE EMIGRATIONS OF ANIMALS FROM THE SEA, by Arthur S. Pearse; The Sherwood Press, Dryden, N. Y. 1950, 210 pp., 23 figs.

We missed this book when it came out in 1950, more or less as an extended outgrowth of the 1936 limited edition of Dr. Pearse's "Migrations of Animals from Sea to Land." As one of his graduate students in the Wisconsin days, any of "Doc's" works brings back nostalgic memories of the first afternoon period classes in the basement lecture room next to the steam pipe entry where we tried to respond to the stimulation of a really great Observer who had gone places and seen things that to most of us were but names and theories in a reference paper. It was the irony of fate that the most skeptical of the class would find himself just ten years later on the shores of Milne Bay at the eastern end of the Papuan mainland, sneaking up on schools of *Periophthalmus koelreuteri*, the frog-faced mud-skippers, trying to get close enough for a habit picture as they perched on the top of off-shore boulders. Like all of Dr. Pearse's books, this one is sparingly but beautifully illustrated.

EUGENICS, GALTON AND AFTER, by C. P. Blacker; Harvard University Press, Cambridge, Mass. 1952, 349 pp., 4 illus., 4 diag., \$5.00

"This volume should not be treated as a formal exposition or text-book of eugenics. It is, rather, an account of the views of its founder, Sir Francis Galton, and of the developments in eugenics which have been witnessed since his death forty years ago." (From the Preface).

INTRODUCTION TO EVOLUTION, by Paul A. Moody; Harper & Brothers, 49 East 33rd St., New York 16, N. Y. 1953, 475 pp., illus., \$6.00

Dr. Moody holds the position of Howard Professor of Natural History and Zoology at the University of Vermont. He is also chairman of the department of zoology there. A member of Phi Sigma and Sigma Xi, he has been a consistent contributor to scientific journals on various phases of systematic serology. This book is designed for students who have little or no knowledge of biology or geology. It is as non-technical as possible, yet scientifically accurate. It is to the author's everlasting credit that he voiced at least a suspicion that Piltdown Man was not scientifically all that he had been cracked up to be by some of the more enthusiastic followers of the Huxley-Haeckel school.

EXPLORING NATURE WITH YOUR CHILD, by Dorothy E. Shuttleworth;

Greystone Press, 100 Sixth Ave., New York 13, N. Y. 1952, 448 pp.

This is a manual for parents who want to guide their children to an understanding of Nature. It also gives a terrific amount of ready material to answer almost any childish "Why?" that may emanate from inquisitive offspring. It is lavishly illustrated both with full-page photographic plates, and with line cuts in two colors. One suggestion might not be amiss, — why perpetuate mythology and leave out other animal references which could be quite as interesting to juveniles? There is sound historical evidence for Elijah's raven of St. Brigid's cow, not to mention many others.

EXPLORING THE INSECT WORLD, by Edwin Way Teale; Grosset & Dunlap Inc., 1107 Broadway, New York 10, N. Y. 1953, 240 pp., illus. \$2.49

This is the revised edition of "grass-root Jungles" which first appeared in 1937. The first book caused a mild furor among nature lovers. This one goes a lot further and should be THE ideal Christmas or birthday present for the interested juvenile. College as well as high school students have leafed through it with interest. The illustrations set a new high in that field. Parents with squeamish attitudes on such ideas as the "struggle for existence" and the "survival of the fittest" had better keep hands off. There are some ghoulish animal battles photographed among these insects.

—F—

FIELD DRAINAGE, by H. H. Nicholson; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1953, 163 pp., 11 tables, 29 figs., 12 plates, \$3.75

Since five of the fifteen references cited in this short treatise are American this hand volume on a much mishandled subject ought to be of interest in this side of the Atlantic. The author is Reader in Soil Science in the School of Agriculture in the University of Cambridge. This should therefore be a valuable reference as to the best thinking on the subject in Britain.

FIFTY TROPICAL FRUITS OF NASSAU, by K. and J. Morton; Text House, Coral Gables 34, Fla. 1954, 118 pp., 55 illus., \$3.00

Anyone who plans to go to Florida should get acquainted with this book. Not to do so would put one in danger of missing some of the truly enjoyable exotic tastes and flavors of the native and introduced tropical fruits. Most of them do not stand shipping well. Hence what is to be enjoyed there must be looked for there. Most of these fruits grow in south Texas, and in the extreme south of California.

FILMS AND FILM STRIPS. (The Editor presents here three guides, two of them to free film and film strips available to schools, the other a commercial agency which charges reasonable rates for rented films. All three of these should be in any mid-

west college library.)

Educator's Guide to Free Films, Educator's Progress Service, Randolph, Wis. \$6.00

Educators Guide to Free Slidefilms, (same address) \$4.00

ROA's Films, 840 N. Plankinton Ave., Milwaukee 3, Wisconsin

FISHERY SCIENCE, G. A. Rounsefell; W. H. Everhart, John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N.Y. 1953, 444 pp., illus., \$7.50
53-7496

The first author hails from the state of Washington, and the second is teaching in Maine. Between them they are able to bracket the fisheries practices of the nation. As a classroom text this book has much to offer, considering as it does both fresh and sea-borne phases of the science, and therefore, the industry.

FOREST POLICY, by William B. Greeley; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. 1953, 278 pp.
52-13808

The author is Vice-President of the West Coats Lumberman's Association. After discussing the history of forest policy and its meaning to the country, he devotes the second part of his book to the forest policies of Germany, France, Switzerland, Russia, Japan, Scandinavia, Britain, Canada and South America. Part Three is devoted to U. S. policies leaving Part Four for the summing up.

FORMALDEHYDE, by J. Frederic Walker; Reinhold Corporation, 330 West 42nd St., New York 36, N.Y. 1953, 575 pp., 41 figs., 59 tables, \$12.00
53-7413

This is a high-priced book for its size but it is worth every cent of its cost. No. 120 in the American Chemical Society Monographs, it is now in its second edition. Considering the amount of formalin used in biological laboratories and supply houses every minute of every school year, some more extensive knowledge of materials used might be expected, but not discovered, among people using it. We found no discussion of its effect on human skins, possible allergies arising out of its use, or their treatment. There is a good discussion of other medicinal uses of formaldehyde. The book literally bulges with references.

400 PLANTS OF SOUTH FLORIDA, by J. F. Morton and R. B. Ledin; Text House, Coral Gables 34, Florida. 1952, 134 pp., 28 full-page drawings, \$3.50

Arranged alphabetically by their scientific names, these 400 plants represent the species to be expected around Key West where the climate is most tropical. The list is surprising for what it contains. Some of the more exotic forms are beautifully illustrated by the line drawings of Dr. Frank D. Venning, in charge of the University of Miami's Swingle Research Project. We own to a feeling of disappointment at not seeing listed our old friends of the southwest Pacific, *Barringtonia speciosa*, with their exotic multi-stamened flow-

ers, octahedral seed-pods, and huge glossy-leaved trunks growing on the very margin of the tropical seas. Is it possible that Florida is missing a bet on this one?

FORMULAS, THE STANDARD AMERICAN ENCYCLOPEDIA OF, ed. by Albert A. Hopkins; Grosset & Dunlap, Inc., 1107 Broadway, New York 10, N.Y. 1953, 1077 pp., illus. \$3.50

This is the fourteenth version of this very handy compendium of more than 15,000 formulae. It is an omnibus in the best and truest sense of the word. There is hardly an ordinary home, or commercial, process that is omitted. The wonder is that it sells for so reasonable a price.

FRESHWATER and SALTWATER AQUARIA, by Francis G. Knowles; British Book Centre, 122 E. 55th St., New York 22, N.Y. 1953, 174 pp., 70 figs., \$2.75
590.7

Dr. Knowles has spent long periods at most of the great marine laboratories of the world, where he has been engaged on research projects. This necessitated maintaining all sorts of aquaria for all sorts of fresh or marine plants and animals. This very practical book is the result of his years of experience.

FRESHWATER FISHERY BIOLOGY, HANDBOOK OF, by Kenneth D. Carlander, Wm. C. Brown Co., Dubuque, Iowa. 1953, 428 pp., 2 illus., \$6.50

This is a source-book. Descriptive matter is kept to about the most reduced minimum we have ever seen. It will therefore be of interest only to the fish technologist, the research worker, and professional conservationists. For them the book will be a mine of reference data.

FUNDAMENTALS OF BIOLOGY, by Harbaugh-Goodrich-Galney-Painter-Haymaker-Wimmer; The Blakiston Company, 575 Madison Ave., New York 22, N.Y. 1953, 611 pp., 278 figs., 30 tables, 3 pl. \$6.00
53-5625

Apparently the whole staff of the biological sciences at the Kansas State College got together in the preparation of this work. It is designed for the non-professional biology class, students of which will not be expected to go farther in the subject. The authors state their objectives very clearly in the preface, and then go about achieving it in a very business-like fashion. For schools committed to the "General Education" program in the first two years of college this might be a good text.

—C—

GARDEN FLOWERS, BOOK OF, by G. A. R. Phillips; Frederick Warne & Co., Inc., 79 Madison Ave., New York, N.Y. 1953, 240 pp., \$3.00

There are over 320 color pictures of English garden flowers. The book will therefore be a surprise to many Americans who regard many of the species figured here merely as weeds. There

is a brief introductory chapter on gardening, and lists of plants for special areas.

GARDEN OF BELLFLOWERS, by Liberty Hyde Bailey; the Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1953, 155 pp., 51 pl., \$5.00

Macmillan has done a good job on this book. Dr. Bailey, in his 95th year of age, has been publishing his work through Macmillan for nearly sixty years. The volume contains discussions and lists of the following: *Campanula*, *Specularia*, *Symphyandra*, *Adenophora*, *Ostrya*, *Michauxia*, *Cynanthus*, *Platycodon*, *Wahlenbergia*, *Edraianthus*, *Codonopsis*, *Canarina*. On page 28 of our 1959 edition of *Rembert Dodoens's "Florum et Coronarium"* there is a cut of *Campanula medium*, L. which came later to be known as "Canterbury" or "Coventry Bells." Dodoens called it "Viola Mariana," for as such, or as "Mariettes," they were called by the Belgians four hundred years ago.

GARDENS, by Lady Allen of Hurtwood and Susan Jellicoe; Penguin Books, Ltd., 3300 Clipper Mill Road, Baltimore 11, Md., 1953, 64 pp., ill., \$1.25

This is the seventh in the Penguin series, — "The Things We See," photographic educational works that deal with houses, furniture, pottery and glass, public transport, ships, and now gardens. This series might be good for social orientation for well educated grown ups. In our U.S.A. the comic-book adept could hardly stomach the high-brow language, much less the photographic art.

GENERAL BIOCHEMISTRY, by William Peterson and Frank M. Strong; Prentice-Hall Inc., 70 Fifth Ave., New York 11, N. Y. 1953, 469 pp., 4 tables, plates and figs., \$8.65

53-8022
This book considers the chemical activities of microorganisms, plants, animals, and in so far as they affect him, man. It first deals with cell materials, then cell functions, with emphasis on the dynamic side of Biochemistry. In their acknowledgements to collaborators the authors have rendered the scientific world their debtors in using a little known quotation from Byron to indicate their acceptance of responsibility for any errors that may be discovered in their book: "Upon the watery plain, the wrecks are all thy deed." That is priceless.

GENERAL BIOLOGY, by L. A. Kenoyer, H. N. Goddard and D. D. Miller; Harper and Brothers, 49 East 33rd St., New York 16, N. Y. 1953 662 pp., 443 figs., \$6.00

53-5079
This is a third edition of a work which appeared first in 1937 and was revised for 1945. It has largely been rewritten and rearranged. It has had an impressive number of adoptions.

GENERAL BOTANY, LABORATORY EXERCISES IN, by Herbert M. Clark and Richard I. Evans; Burgess Pub. Co., 426 So. 6th St., Minneapolis 15, Minn. 1953, 104 pp., \$1.50

With the cooperation of most of the botany staff at the University of Wisconsin, Drs. Clark and Evans present this laboratory program of some 26 exercises, presumably to accompany the so-called "Wisconsin Text," published by Macmillan, but it is conceivable that these exercises could easily be used with any text. This outline in its main features has been in use for some time in Madison, but this is the first time it has been made available to the general public in this form. It starts out with the study and identification of the gymnosperms, angiosperms, seeds, seedlings, mature plants, flowers and fruits. Then it introduces the student to the microscope, the cell, physiological processes in the cell, nuclear and cell division, plant organs, photosynthesis, digestion, respiration, water relations, irritability, and finally to five exercises devoted to typical forms in the algae, fungi, bryophytes, primitive tracheophytes, and the ferns. The course ends with reproduction in the gymnosperms and angiosperms.

GENETICS, TEXTBOOK OF, by William Hovant; The Elsevier Press Inc., 402 Lovett Blvd., Houston 6, Texas. 1953, 450 pp., 267 figs., 49 tables, \$5.95

53-7246
This new text will not be popular with sophomore-minded undergrads. It is definitely pitched at the graduate level or as a reference work. There is much more here of hereditary human physical disorders than one usually finds in books of this sort. There are also tables of statistical and genetic data which will be helpful to research workers. There are two indices, one of subject matter, the other of authors quoted or references recommended.

GENUS CODIUM, by Paul C. Silva; University of California Press, Berkeley, Calif., 1951, pp. 79-114, pl. 1-6, 32 figs. in text. \$0.50

Full title of this article published separately is explanatory: "The Genus Codium in California, with observations on the structure of the walls in the utricles."

GLACIER VARIATIONS AND CLIMATIC FLUCTUATIONS, by H. W. Ahlman; American Geographical Society, Broadway at 156th St., New York 32, N. Y. 1953, 51 pp., 11 figs. \$2.50

This is the third of the Isaiah Bowman Memorial Fund Lectures. It was delivered at the 17th International Geographical Congress in the nation's capital in August 1952. As a chapter in climatology which has always been of biological interest to evolutionists, ecologists and historical geologists, it pays the reader well.

GOD AND THE UNIVERSE, by Holger Christian Langmack; Philosophical Library, 15 East 40th St., New York 16, N. Y. 1953, 175 pp., figs. \$4.75

Subtitled "Unity of Science and Religion," this book is so far over this Editor's head that he is content to let the publisher's summary speak for itself: "God and the Universe presents

the story of creation as a dimensional progression of: physics, biology, psychology, learning and psychiatry, substantiated by the newly discovered Simple Mathematical Relativity. Thus science and religion become united in scientific faith. This will speedily unite Jews and Christians, and in time stamp out social diseases and unite mankind everywhere for universal peace and goodwill." A consummation devoutly to be wished for, all objections to the contrary notwithstanding.

GOETHE'S BOTANICAL WRITINGS, tr. by Bertha Mueller; University of Hawaii Press, Honolulu, Hawaii, 1952, 258 pp., 51 figs. 4 pl. \$5.00

52-11354

So much has been written about Johann Wolfgang Goethe as a litterateur, that his scientific proclivity and botanical interests were for a long time pretty thoroughly lost in the shuffle. Of recent years there has been more attention paid to his scientific interests, especially in *CHRONICA BOTANICA*. It is good to see this collection appear so that monolingual botanists will be able to assess him at his true worth.

GOURMET COOKING FOR CARDIAC DIETS, by Florence Field; World Publishing Co., 2231 West 110th St., Cleveland 2, Ohio, 1953, 350 pp., \$3.50

53-6646

With the attention being paid to heart troubles (non-amatory) this book should be of considerable interest to those so afflicted. Its main divisions include reducing diets, sodium-restricted diets, low-fat low-cholesterol diets, low-purine diets. Accompanying each of these suggestions is a raft of recipes which should make the recommended diets both feasible and appetizing. The suggestion to use all sorts of different herbs to season foods in place of salt looks intriguing. This is not a laboratory manual. It is a cookbook. Its recipes can be enjoyed by the whole family, those not on the salt-free regime can add the salt to taste at the table. Also a practical suggestion.

GROWING FRUIT AND VEGETABLE CROPS, by T. J. Talbert; Lea & Febiger, Washington Square, Philadelphia 6, Pa. 1953, 350 pp., 72 ills., charts, \$4.50

53-9582

This is a new book by the well known professor emeritus of horticulture at the college of agriculture in the University of Missouri. In it he discusses so many kinds of fruits and vegetables which are not being grown in quantities of commercial value, that this book may prove the opening wedge to a new conception of horticultural procedure. It seems evident that our people are becoming curiously one-tracked in their diet. A book of this sort, attractive to students and lay-folk alike could do a lot of good.

GROWTH AND DIFFERENTIATION IN PLANTS, ed. by Walter E. Loomis; Iowa State College Press, Press

Building, Ames, Iowa, 1953, 458 pp., plates, figs., tables, \$7.50

53-12179

This is a monograph of the American Society of Plant Physiologists, to which twenty of the ranking botanists and plant physiologists of the country have contributed thought-provoking as well as informative papers. To mention the names of Dr. Sinnott, Baldovinos, O'-Kelly, Carr, Esau, Buchanan, Sprague, Thornton, Naylor, Thompson, Rosene, Lund, Gordon, Bonner, Liverman, McKee, Commoner, Zucker, Riker, Hildebrandt and Hutner will give a hint as to the extent the book reaches.

GUIDE TO NATURE HOBBIES, by E. L. Jordan; C. S. Hammond & Co., Maplewood, N. J. 1953, 64 pp., 146 ills., 2,95

To go into detail on this book would take too long. It must be seen to be appreciated. Hobbies treated are mineralogy, shells, plants, terraria, aquaria, birds, entomology, photographing wildlife, sports. Well chosen illustrations make the mechanical side of each hobby group better understood and effective. References are given.

-H-

HARVEY, BIBLIOGRAPHY OF THE WRITINGS OF DR. WILLIAM, by Geoffrey Kynes, Cambridge University Press, 32 East 57th St., New York 22, N.Y. 1953, 80 pp., 8 pl. \$10.00

This second reset edition of Keynes' bibliography of Harvey's works includes new entries discovered since its predecessor was printed, also an entirely new copy of a picture of the young Dr. Harvey which has only recently come to light. This is a beautiful piece of the printer's art, a little expensive, but worthy of a place in any university or college library.

HEALTH FACTS FOR COLLEGE STUDENTS, by Maude L. Etheredge; W. B. Saunders Co., 218 W. Washington Square, Philadelphia, Pa., 1953, 392 pp., 70 figs., 8 pl. \$4.00

53-5309

This deservedly popular textbook of personal hygiene at the college level is here presented in its sixth edition. It is a sad commentary on American private as well as public school education that over fifty percent of college freshmen in some areas have had no previous teaching or training in human hygiene or physiology. Most of the things taught in this book should have been learned in the grades.

HISTOLOGY, TEXTBOOK OF, by Jose F. Nonidez and William F. Windle; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1953, 528 pp., 214 sk., 233 pl., tables, etc. \$9.50

52-12360

It is rare that a textbook could be so rapidly absorbed by the trade that in three years a new edition becomes necessary. The preface to this new second edition probably gives the answer as to how this occurred. Evidently the new approach to teaching his-

tology is successful. As a textbook for the beginner, not a reference work for the profession, it assumes that the student has little knowledge of anatomy or physiology.

HISTOLOGY, by Arthur W. Ham; J. B. Lippincott Co., East Washington Square, Philadelphia 6, Pa. 1953, 866 pp., 518 figs., \$10.00

This is the second edition of a large, profusely illustrated text which first came on the scholastic scene in 1950. The author is professor of Anatomy in the Medical and Dental Faculties of the University of Toronto. In addition to the general excellence of the book as a whole, the first part, entitled "What Histology Is and How It Is Studied," is a model for anyone committed to instruction in the biological sciences.

HOW ANIMALS MOVE, by James Gray; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1953, 114 pp., 15 pl., 52 figs., \$3.00

Six lectures given to children at the Royal Institution are here reproduced. They deal with the machinery of animal movement, swimming, walking and running, jumping and creeping, flying animals and flapping flight.

HOW TO BE HEALTHY IN HOT CLIMATES, by Eleanor T. Caverly; Thomas Y. Crowell Co., 432 Fourth Ave., New York 16, N. Y. 1953, 286 pp., maps, tables, \$3.50

Anyone who has ever spent any appreciable time in the tropics, learning by grim necessity what this book aims to teach, will appreciate how right the author's recommendations are. Anyone who expects to spend some time in tropical areas should get this book, and will probably wind up by taking it with him.

HOW TO KNOW AND PREDICT THE WEATHER, by Robert Moore Fisher; New American Library of World Literature, 501 Madison Ave., New York 22, N. Y. 1953, 167 pp., 16 maps, 16 pl., 5 pl. \$0.35

This is a MENTOR book. It originally appeared under the title "How about the Weather" and was published by Harpers. In its present form it is a pocket book and could be picked up wherever the dealers are willing to stock intelligent rather than clap-trap pocket books. The introduction by Ernest J. Christie, Meteorologist in Charge of the New York U. S. Weather Bureau Office should be warrant of its accuracy of information.

HUMAN BIOCHEMICAL GENETICS, by H. Harris; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1954, 96 pp., 31 tables, 33 figs., \$2.75

This is the 37th of the Eugenics Laboratory Memoirs, from the Galton Laboratory, University College, London.

It is prefaced by words from L. S. Penrose, M.D., F.R.S. It deals with biochemical specificity in humans, such as was described by Sir A. E. Garrod in 1902 in relation to the heredity of alkaptonuria.

New York 22, N. Y. 1953, 798 pp., 1400 drawings, in 453 ills., 2 col. pl. \$12.00
53-7877

There are fifty-five pages of bibliography to this second edition of Dr. Patton's justifiably esteemed textbook. The two-columned index takes up 35 pages. There have not been any too material changes in the original work to warrant extended notice here. The recent extensions of knowledge in human embryo development, and in regard to the development of the heart and great vessels, have both been recognized and incorporated in the new edition.

HUMAN SENSES, by Frank A. Geldard; John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953, 365 pp., 104 figs., 5 tables, \$5.00

52-13881

This is the first book to aim at a descriptive account of man's senses from the psychophysiological point of view. The author treats each of the sense channels from the standpoint of physics of stimuli, and the anatomy and physiology of the sense organ. He is professor of psychology at the University of Virginia.

HUNTING AND FISHING IN NORTH AMERICA, by Michael Cramond; The University of Oklahoma Press, Norman, Oklahoma, 1953, 394 pp., \$5.95
53-8816

The Nimrod or the Ike Walton in your most select circle of acquaintances could be bound to you more closely by the gift of this excellent book. Its author is a hunter, fisher, explorer, guide, when he is not at his regular job of representing the Curtis Circulation Company in British Columbia. "The book," he says, "is the result of thirty-odd years of personal experience in hunting and fishing from Alaska to Mexico. Don't look for anything very scientific, because I don't know anything very scientific. I just like to hunt and fish."

—I—

INFECTIOUS DISEASE, by Sir Macfarlane Burnet; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1953, 356 pp., 12 figs., 1 pl. \$4.50

Now fully titled "Natural History of Infectious Disease," this work was first published in 1940 as "Biological Aspects of Infectious Disease." It considers the nature, causes, action and combating infectious disease, and is pitched at the head of the average, not the professional reader. The author is an Australian who has held positions as resident pathologist in his native country, England, Harvard and Johns Hopkins. His last chapter devotes several pages to the potentialities of bacteriological warfare.

INSECT, FUNGUS AND WEED CONTROL, by Dr. E. R. de Ong; The Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. 1953, 400 pp., 37 figs., \$10.00

In this book there are chapters on the "insecticide label," seed disinfectants, herbicides, forest insects and diseases, livestock insects, and pets found in household and industry. Apparently the author hasn't missed a trick in the number or kinds of controls available nowadays.

INSECTS, THEIR SECRET WORLD, by Evelyn Cheesman; William Sloane Associates, 425 Fourth Ave., New York 16, N. Y. 1953, 246 pp., 16 ills. \$3.50

53-7710

Another study in the *mode Fabre* of the habits, makeup and activities of various insects. As the jacket "blurb" intimates, there are no "academic technicalities." But don't let the absence of foot-notes, or bibliographies, or just plain "references" fool you. The author was for some years Curator of Insects to the Zoological Society of London. She is also a geographer of note. Incidentally she has perambulated about in Papua, Dutch New Guinea, the New Hebrides, New Caledonia, etc.

INSECTS CLOSE UP, by Edward S. Ross; University of California Press, Berkeley 4, California. 1953, 81 pp., 117 figs., plates, sketches, etc. Paper \$1.50, cloth \$2.25

Of paramount interest to entomologists and to photographers, this is a superb piece of work. Anyone else with any kind of interest in biology will be thrilled by the methods the distinguished author employs and explains as well as the results he obtains. Definitely unusual.

INTRODUCTION TO LABORATORY CHEMISTRY, by Earle Arnow; C. V. Mosby Co., St. Louis, Mo., 1953, 108 pp., 38 figs., 5 tables. \$1.50

This is the fourth edition of a lab manual to accompany the Arnow text reviewed elsewhere in this issue.

ISOTOPIC TRACERS IN BIOCHEMISTRY AND PHYSIOLOGY, by Jacob Sacks; McGraw-Hill Books Co., 330 West 42nd St., New York 36, N. Y. 1953, 383 pp., 25 ills., \$8.50

52-12364

The author served as director of pharmacology for a commercial drug production firm before he went to the position of physiologist at the Brookhaven National Laboratories. At present he is associate professor of Chemistry at the University of Arkansas. With this background it is not hard to see how he could write a book on the use of isotopes which would aim to be comprehensive but clear, integrated yet adequate, current and still discriminating for the use of both the student and the physician.

—L—

LAKE STATES FOREST EXPERIMENT STATION, University Farm, St. Paul 1, Minnesota. No charge.

We continue to receive the "Techni-

cal Notes' from the office of M. B. Dickerman, Director of this station. They are, as usual, brief, clear and concentrated on one topic for each report. They generally come in groups of ten or so, and give the latest information on situations in the Lake States anyone interested in forestry would like to know. The Annual Report for 1952 covered a survey of Minnesota, Wisconsin and Michigan, and some 56 brief summaries of forest management research problems in progress.

LABORATORY TECHNIQUE IN BACTERIOLOGY, by Max Levine, Macmillan Company, 60 Fifth Ave., New York 11, N. Y. 1954, 413 pp., 7 figs., tables, charts and keys. \$4.50

This is the third edition of a well-known manual. New features are the rearrangement of materials into eight progressive categories, keys to several bacteria-families, formulae for digest preparations in emergencies, etc.

LECTURES ON THE THYROID, by J. H. Means; Harvard University Press, Cambridge, Mass. 1954, 113 pp., 11 figs., 1 pl. \$3.00

54-5021

Harvard University Press presents here an authoritative little book by Emeritus professor of clinical medicine in the University School of Medicine and former chief of medical services at the Massachusetts General. As an epitome of recent advances in thyroid research this book is about as authoritative as one could wish.

LEGUMINOSAE OF ILLINOIS, by William G. Gambill, Jr.; University of Illinois Press, Urbana, Ill. 1953, 117 pp. Paper \$3.00, cloth \$4.00

52-12403

A taxonomic monograph which is of particular interest because of the commanding taxonomic position of the State of Illinois. One could wish that a map of the counties had been included.

FUNDAMENTALS OF THE LIFE SCIENCES, by Mark A. Graubard; Burgess Pub. Co., 426 South Sixth St., Minneapolis 15, Minn. 1952, 266 pp., 177 figs.

This is a spiral-bound, litho-printed, textbook without preface, or bibliographies. The author acknowledges his indebtedness to twelve other textbooks in the field. He is associate professor in General Studies at the University of Minnesota's department of natural science. Lacking the author's statement of objectives it is pretty hard to pin-point one's ideas of the book. Apparently it is a text for general biology, but it is more physiological than morphological, more human than animal, more animal than plant.

LIVING BRAIN, by W. Grey Walter; W. W. Norton Co., New York, 1953, 311 pp., 22 figs. \$3.95

The author of this first edition is one of the foremost electro-encephalographers in the world, being editor of the International EEG Journal. This volume attempts to publicize in "language understood of the people" the last 20 years' advances in the field.

In well-written chapters the author discusses such interesting points, among others, as memory, genius, lunacy, crime, hypnotism, sleep and fatigue.

—M—

MAKERS OF MODERN SCIENCE, by P. B. Sears, G. Zilboorg and Leopold Infeld; Charles Scribner's Sons, New York, 1953, 134 pp. \$4.00

This is a combined reprinting of three older books, "Charles Darwin" by Sears which first appeared in 1950, Zilboorg's "Sigmund Freud" came out in 1951. Infeld's "Albert Einstein" also appeared for the first time in 1950.

MAJOR FEATURES OF EVOLUTION, by George G. Simpson; Columbia University Press, 2960 Broadway, New York 27, N. Y. 1953, 434 pp., 52 figs., 28 tables, bibl. \$7.50

53-10263

This is a rewritten version of the author's "Tempo and Mode of Evolution" which first appeared in 1944, with much acclaim from the biological periodicals at the time. The newer work is Number 17 of the Columbia Biological Series. The author is curator of fossil mammals and birds at the American Museum of Natural History. As such this book has a backing in such high places as to be impressive and worthy of careful reading. By illustrations drawn from processes going on today the author explains what has happened among organisms during the last billion or more years. He has drawn on all the biological fields for his facts so his appeal will be equally to the biologist, the paleontologist, the geneticist, the zoologist, the botanist and the evolutionist.

MAN, TIME AND FOSSILS, by Ruth Moore; Alfred A. Knopf, New York, 1953; 411 pp., 32 pl., sketches. \$5.75

53-6854

Beginning with a sea-sick Darwin on the voyage of the "Beagle," and ending with Libby's carbon-dating the spruce tree relics bowled over by a glacier 11,000 years ago, this book presents in twenty rather breathless chapters the story of modern biology and anthropology. The story has been told in bits, and elsewhere over and over. It took a professional journalist to see the news-worthy features and combine them into one connected theme. The Piltdown hoax came to light after this book was published.

MANURES AND FERTILIZERS, A Survey; Chemical Publishing Co., 212 Fifth Ave., New York 10. N. Y. 1952, 96 pp. \$2.50

This is a British bulletin from the Ministry of Agriculture and Fisheries which has had wide and well-merited distribution sufficient to warrant its being reprinted in this country. The impartial discussion of all the soil-enriching materials gives it a special appeal to those who are interested in better crops of whatever variety.

MEDUSAE OF THE BRITISH ISLES, by Frederick Stratten Russell; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1954, 530 pp., 35 pl., 319 text figs., bibl. \$22.50

Dr. Russell is the Director of the Plymouth Laboratory of the Marine Biological Association of the United Kingdom, the British counterpart of our Marine Biological Laboratory at Woods Hole, Mass. His large and opulently illustrated monograph brings up to date the scattered bits of information, discovery and research which have made the work of those interested in the Medusae no easy task. The author emphasizes the importance of the small animals as indicators of the movement of water masses in the sea. An interesting and helpful key for quick recognition of the distinctive types is found on pages 42 to 45 where 80 small sketches are presented. This is an expensive book but one no zoological library worthy of the name can afford to be without.

METABOLISM OF THE ALGAE, by G. E. Fogg; John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953, 149 pp., 20 diagr. \$2.00

From the botanical department of University College, London, comes this new Methuen pocket-sized handbook. Under the aegis of Drs. Fritsch and Pearsall the author has summarized not only much of the already published but considerable thus far unpublished research. There are chapters on phototrophic assimilation of carbon, chemotrophic assimilation of carbon, autotrophic assimilation in relation to nitrogen metabolism, heterotrophic metabolism, the products of metabolism, and growth and metabolism.

MICROBIOLOGY, PRINCIPLES OF, by Walter W. Krueger; W. B. Saunders Co., W. Washington Sq., Philadelphia 5, Pa. 1953; 648 pp., 143 figs., \$5.50

53-5317

MICROBIOLOGY, LABORATORY MANUAL, by Catherine J. Witton; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1952, 76 pp., \$2.00

52-7449

This laboratory manual is designed for use with the author's text, "Microbiology with Applications to Nursing." In view of its peculiar purpose the section designated "For the Teacher" is particularly appropriate and should make it a very effective laboratory guide. It is based on a series of laboratory guides which have been in use at Simmons College since 1922. It has, therefore, the added value of being a tried and acceptable manual.

MICROMETEOROLOGY, by O. G. Sutton; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1953, 333 pp., 35 figs. \$8.50

51-13596

More and more one notices that British authors are being introduced to the American public by our own publishers. This is another example, and probably explains itself in that too few of our scientists are covering the more

specialized aspects of their fields. This book, subtitled "A Study of Physical Processes in the Lowest Layers of the Earth's Atmosphere," discusses these layers and their properties as they affect agriculture, hydrology, air pollution and the like.

MICROSCOPE, THE INTELLIGENT USE OF, by C. W. Oliver; Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. 1953, 192 pp., 59 figs., \$4.00

This first American edition of a British work which ran through two editions lucidly and simply introduces the student to limits of resolution, important microscopical accessories, illumination systems, correction procedures, measurements and counts and photomicrography.

MINERAL DEFICIENCIES IN PLANTS, by T. Wallace; Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. 1953, 111 pp., 312 color plates, \$10.00

This is really an extraordinary book. Its full title "The Diagnosis of Mineral Deficiencies in Plants by Visual Symptoms" is exactly chosen. A full two thirds of the book is given over to the largest number of color plates we have seen in a scientific publication to date. Plants figured are all of truck-garden or farm importance, i.e. fruits and vegetables. Would that some American firm would do the same for the ornamentals.

MITOSIS, by Franz Schrader; Columbia University Press, 1780 Broadway, New York 27, N. Y. 1953; 170 pp., 19 figs., \$4.00

Since 1944 this work was reprinted in 1946, 1949, but the cytological advances made in recent years required an entirely new edition. The author is professor in the department of zoology at Columbia University, a position he has held since 1930. This edition follows substantially the same outline as the first, but critically analyzes the current mitotic hypotheses.

MY GREAT OAK TREE, by Liberty Hyde Bailey; Chronica Botanica, Medford, Mass. 1952.

At the A. I. B. S. meetings at Cornell in September of 1952, the editors of *Chronica Botanica* published for free distribution twelve bits of verse from a most unexpected source. Their author, the esteemed EMERITUS of Emeriti in the botanical world, Dr. Liberty Hyde Bailey, here demonstrates that he is not only a scientist, botanist, explorer, but also an artist and poet. Free copies may still be available.

—N—

NAME THAT ANIMAL, by Ernest C. Driver, (sold by the author), 119 Prospect St., Northampton, Mass., 1950, 558 pp., illus. \$6.50

A guide to the common land and freshwater animals of the United States, this manual is the first to appear for a long time in the field of animal taxonomy. That it is practical

as well as useful has been demonstrated in the editor's own laboratory. It deserves to be better known.

NATURE AND THE ARTS, by M. Peter Piening; The Kingsport Press, Kingsport, Tennessee, 1953. 36 pp., 24 pl. No charge.

During 1951-1952 there appeared in "Publishers Weekly" a series of twenty-four plates showing comparisons between Nature and the Arts. These have been frequently commented upon and requested, especially by publishers, librarians, students of the art of book-making. More fascinating than usual are the pictorial comparisons between the maple samara and helicopter vanes, rock crystal and an obelisk, winter horsetail and a minaret, the medusae and a parachute, pliers and the lobster claw, a spiral staircase and a bisected nautilus shell.

ORIGIN OF LIFE, by A. I. Oparin; Dover Publications, 1780 Broadway, New York 19, N. Y. 1953, 270 pp., cloth \$3.50, paper \$1.70

This book was reviewed in this periodical back in 1933 when it was first published by Macmillan. The translator, Dr. S. Morgulis of the College of Medicine at the University of Nebraska, has been prevailed upon to write another introduction to this reprinting. One wonders what has become of Dr. Oparin in the changing tides of Soviet science. His introduction of F. Engels' "Dialectics of Nature" in his second chapter on the continuity of life showed that he was devoutly following the Marxian line, and should have insured him of the same.

—P—

PAPERS OF MICHIGAN ACADEMY OF SCIENCE, ARTS AND LETTERS, ed. by G. E. Potter and F. K. Sparrow; University of Michigan Press, Ann Arbor, Michigan. 1953, 507 pp., figs., maps, plates, \$10.00

There is comparatively little art, almost no literature, and a great predominance of science in this report of the 1952 meeting of the Michigan Academy. To be exact there are 111 pages of botanical interest, 22 devoted to forestry, 140 taken up with zoology, 32 geographical, 56 geological and 18 anthropological. The scholastic connections of those contributing to the volume are not given.

PHYSIOLOGICAL CHEMISTRY, by Arthur K. Anderson; John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953, 480 pp., 42 figs., 12 tables, \$5.00

This is the fourth edition of the well-known text by the professor of physiological chemistry at Pennsylvania State College. It includes new matter on isotopes, the Haworth formulae on carbohydrates, anti-oxidants among the lipids, chemotherapy and the adrenal hormones, as well as changed emphases on the physiological action of the vitamins, folic acid, the animal protein factor, and anti-vitamins.

53-3612

PHYSIOLOGICAL CHEMISTRY, REVIEW OF, by Harold A. Harper; Large Medical Publications, Box 1215, Los Altos, California. 1953, 329 pp., 29 tables, 17 figs.

53-8822

This fourth edition stamps the favorable acceptance of this companion and supplemental volume to accompany standard texts in biochemistry. It has been considerably expanded over its predecessors, and could be used in conjunction with basic science lectures in the graduate training of physicians, as, indeed, the author originally intended. He is professor of biochemistry in the University of San Francisco, and lecturer in surgery at the University of California School of Medicine.

PHYSIOLOGY, by R. J. Main and A. W. Richardson; C. V. Mosby Co., St. Louis, Mo., 1953, 474 pp., 46 figs., \$7.00

This second edition of the 1946 original represents the earnest endeavors of another group of textbook authors to keep up with the headlong pace of modern physiology. As in the previous edition this text sticks to human physiology and makes no pretense at being comparative. It presents in order, basic physiologic systems, metabolism systems, homeostatic mechanisms, fluid systems and the integrative systems of the body.

PHYSIOLOGY OF MAN, by L. L. Langley and E. Cheraskin; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. 1954, 609 pp., 180 figs., \$5.50

53-9000

Dedicated to the proposition that learning can be fun, this new text is noteworthy for its direct and explicit, not to say dogmatic approach, its logical sequences, its use of thumb-nail cartoons to clarify concepts, and selective illustrative material instead of encyclopedic statements. There are no bibliographic references to distract students.

PHYSIOLOGY OF MUSCULAR ACTIVITY, by Peter V. Karpovich; W. B. Saunders Co., Philadelphia, Pa., 1953, 340 pp., 77 figs., \$4.75

53-5486

This is the fourth edition of a work which originally appeared under the authorship of Edward C. Schneider. Dr. Karpovich was associate editor of the third edition. He has completely revised most of the work and added two new chapters on nerve control of muscular activity, and on energy cost of various activities. The work is still within the time and content range of an average semester course in physical education.

PIONEER PLANT GEOGRAPHY, by W. B. Turrill; Martinus Nijhoff, 9 Lange Voorhout, The Hague, Netherlands. 1953, 267 pp., 21 pl., 19 guilders
In reality this book could have been named "Sir Joseph Dalton Hooker, Phytogeographer," since it is mainly an excellent biography, with rich supply of direct quotations from original sources. The book's chapters cover the

distribution of Arctic plants, Syria and Palestine, India, Africa, North America, the Galapagos, Antarctica, and a number of minor and miscellaneous island floras.

PLANNED MANAGEMENT OF FORESTS, by N. V. Brasnett; St. Martin's Press, 103 Park Ave., New York 17, N.Y. 1953, 238 pp., 8 figs., \$3.50

The author of this work is lecturer in forest management in the Imperial Forestry Institute, Oxford. He was formerly connected with the Colonial Forest Service. The first three chapters of the work deal with the growth and organization of forest crops. The next fifteen cover various phases of planning management. The last six deal with the development of forest management in western Europe. The author has left Canadian, U. S. and Mexican forestry severely out of the picture. Anyone who wants a statement of purely European procedures will get it here.

PLANT GENERA, a Symposium; Chronica Botanica, Waltham, Mass., Stechert-Hafner, Inc., New York 1953, 70 pp., figs., and reprod. 32.00

This fascicle is a separate (no. 3) of Vol. 14 of *CHRONICA BOTANICA*. It consists of an editor's foreword, and introductory essay by Theodore Just, a discussion of the nature of plant genera by G. H. M. Lawrence, an anatomical approach by I. W. Bailey, floral anatomy by A. J. Eames, the cytogenetic approach by R. C. Rollins, genera delimitation by use of cytology and embryology, and a final paper on the role of plant geography in taxonomy by H. L. Mason.

PLANT GROWTH SUBSTANCES, by L. J. Audus, Interscience Publishers, 250 Fifth Ave., New York 1, N.Y. 1953, 465 pp., 52 figs., \$6.50

Apparently here is a British author who finds it no particular feat to straddle the oceans, intellectually at least. His citations rage from England to the Netherlands, the United States, Java and Australia with refreshing catholicity. His citations are many, there are five appendices, and 19 pages of subject-index. For a world view of auxins, hormones and the like, this book appears to be worth investigating.

PLANT HUNTER IN MANIPUR, by F. Kingdon-Ward; British Book Centre, 122 E. 55th St., New York 22, N.Y. 1952, 254 pp., 12 pl., map. \$3.25

A member of the Royal Geographical Society and the Massachusetts Horticultural Society tells in very entertaining style his experiences in that little known region between Bengal and Burma. His latest journey, since he had been there before, was to collect new and strange plants for the New York Botanical Garden. It is a safe bet that any botanist who starts on this book will not lay it down in a hurry.

PLANT MORPHOLOGY, by Arthur W. Haupt; McGraw-Hill Book Co., 330

West 42nd St., New York 36, N.Y.
1953, 464 pp., 338 figs., \$8.00

52-13810

This book covers the plant kingdom, — Thallophyta, algae and fungi; Bryophyta, Pteridophyta, Spermatophyta, and their evolution, not only from their morphological relationships, but also from their evolutionary tendencies. Designed for the junior-senior course offered to botany majors. Unusually well illustrated with the large majority of the illustrations never before published. For the small department which cannot venture into offering separate morphology courses such as might be expected in the graduate school of a university, this would appear to be the answer to many a botany professor's wishes.

PLANTS IN POTS, by William H. Clark;
Little Brown and Co., Boston, Mass.,
1953, 210 pp., ill., \$2.95

53-7329

A popular writer on gardening, both out doors and in, packs a lot of horse-sense in the small compass of this pocket-sized book. An ideal gift for the home plant grower, with a lot of new "wrinkles" to make home horticulture more of a success and therefore more of a pleasure than it has been.

POCKET GUIDE TO THE TREES, by
Rutherford Platt; Pocket Books, Inc.,
630 Fifth Ave., New York, N.Y. 1953,
256 pp., 35c

52-7207

Originally appearing under the Dodd, Mead & Co., imprint in 1952, this book has been reprinted as a Cardinal Edition by Pocket Books. Safe to say this is the biggest thirty-five cents worth of book available to botanists anywhere in the world. The subtitle "How to Identify and Enjoy Them" gives the scope of the work. The pictures, both photographic reproductions and the black and white sketches are superior.

POND LIFE, by Jean Gorvett; Penguin
Books, Inc., 3300 Clipper Mill Road,
Baltimore 11, Md., 32 pp., all plates,
50c

This is the Puffin Picture Book No. 93, and although designed to interest children in aquatic inhabitants and their environment, always causes an interested reaction from college and other adults. The fact that numbers of these pond lovers are British would seem to indicate that an American version is in order, or even a whole series, for the various locales of American ponds.

PRACTICAL CHROMATOGRAPHY, by
Robert C. Brimley and Frederick C.
Barrett; Reinhold Publishing Corporation,
220 West 42nd St., New
York 36, N.Y. 1953; 128 pp., 34 figs.,
\$5.00

The authors are connected with the Low Temperature Research Station at Cambridge University. The book discusses latest techniques in paper chromatography and its applications, and column chromatography under three

headings, — adsorption, partition, and ion-exchange. There is also a chapter on accessory apparatus. With the rapid development of this analytical technique, it is good to get the most recent developments on it from overseas.

PRACTICAL MANUAL OF MEDICAL
AND BIOLOGICAL STAINING
TECHNIQUES, by Edward Gurr;
Interscience Publishers Inc., 250
Fifth Ave., New York 1, N.Y. 1953,
320 pp., \$4.00

Divided into six sections and eight appendices, this valuable work opens with general fixation and other preparation techniques, then discusses normal and pathological animal histology, methods with normal and infected plant tissues, cytological methods, fluorescence microscopy, smear preparations. The appendices contain atomic weight tables, conversion tables, formulae for fixatives and stains, refractive indices, saturated reagent solutions, specific gravities, and stain solubilities and atomic weights.

PRACTICAL TAXIDERMY, by John
Moyer; Ronald Press, 15 East 26th
St., New York 10, N.Y., 1953, 126 pp.,
101 figs., formulae, \$3.00

52-10622

Anyone who has ever wandered with an attentive eye through the Chicago Natural History Museum on the Lake Michigan front must have marvelled at the extremely attractive stuffed animals in their habit mountings. A staff member of that institution here tells all about it in this working guide.

PRINCIPLES OF LINE ILLUSTRATION, L. N. Staniland; Harvard University Press, Cambridge 38, Mass.,
1953, 212 pp., 161 figs., \$5.00

This book aims to show biologists just how to make their own drawings to illustrate their work for reference, class use or publication. Chapters discuss techniques in line drawing, aids to accuracy, use of color, graphs, diagrams and maps, lettering helps, and an appendix of hints and tips. It is simple, clear and practical.

PRINCIPLES OF VETERINARY SCIENCE, by Frederick B. Hadley; W. B. Saunders Co., 218 W. Washington Sq., Philadelphia, Pa. 1954, 546 pp.,
113 figs., 20 tables

53-6640

This is the fifth edition since 1920 of a standard text which originated at the University of Wisconsin Agricultural Experiment Station. It is not intended for courses in veterinary medicine. It is designed for students in the agriculture courses and as a handy reference for live stock growers.

PRODUCTION OF ANTIBODIES, by Sir
Macfarlane Burnet and Frank Fenner;
St. Martin's Press, 103 Park
Ave., New York 17, N.Y. 1953, 142 pp.,
11 figs., 2 tables, \$3.00

This reprint of the revised 1949 edition of the original 1941 publication is characterized by its proposing the "self-marker" hypothesis in relation to the absence of antigenicity in the

body's constituents and the failure of mammalian and avian embryos to produce antibody. The authors have entirely rewritten the parts of the book dealing with the lymphocytes and plasma cells as probable producers of antibody.

PROTEIN METABOLISM, HORMONES AND GROWTH, a Symposium; Rutgers University Press, New Brunswick, New Jersey, 1953, 80 pp., ill., figs.

Early in February of 1952, the eighth annual conference on protein metabolism held at Rutgers University produced these papers: Effect of Protein and Amino acids of Diet on the Endocrine System, by Leo T. Samuels; Relationships between the Thyroid and Protein Metabolism, by James H. Leathen; Protein Anabolic Action of Androgens, by Charles Kochakian; Relationships between the Adrenal Cortex and Protein Metabolism, by Frank L. Engel; Effects of Growth Hormone on Metabolism of Nitrogen by Jane A. Russell; and Hormonal Regulation of Human Growth, by Laurance W. Kinsell.

PSYCHOLOGY, DOUBLEDAY PAPERS IN, — **Historical Roots of Learning Theory**, by Horace B. English (65c); and **The Natural Man**, by Clarence Leuba (75c), 21 and 70 pp. 1954

54-6935
54-6936

These paper covered pamphlets are the two first to appear in the projected series of the Doubleday Papers in Psychology, under the editorship of Eugene L. Hartley, City College, New York. **The Natural Man** paper includes discussions on wild children, chimpanzees, nonliterate peoples. In the **Roots of Learning** paper numerous generally accepted facts are found to be obsolete theories or errors arising out of popular misconceptions.

—Q—

QUANTITATIVE PHARMACEUTICAL CHEMISTRY, by G. L. Jenkins, J. E. Christian and G. P. Hager; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. 1953, 534 pp., 57 figs., 75 tables, \$6.50

53-5558

This is the fourth edition of a text which originally appeared in 1931 and has been going strong ever since. It has proved popular with drug analysts, students and teachers in pharmaceutical fields. Part 1 treats of general gravimetric and volumetric analyses, Part 2 contains special pharmaceutical analysis methods, Part 3 treats of physico-chemical methods.

—R—

REPTILES AND AMPHIBIANS, by Herbert S. Zim and Hobart M. Smith; Simon & Schuster, New York, N.Y. 1953, 157 pp., ill. in color, \$1.00
212 species in full color in a pocket manual by two undeniably reliable scientists.

RESTLESS ATMOSPHERE, F. K. Hare; Longmans, Green and Co., 55 Fifth Ave., New York 3, N.Y. 1953, 192 pp., 17 figs., Text ed. \$1.80, Trade ed. \$2.40

This book covers two phases of atmospheric study. First a brief review of the physical laws governing weather. The second half treats of earth regions, describing climate in an explanatory way.

ROCK WALL AND WATER, ed. by F. A. Mercer & Roy Hay; Studio Publications, 432 Fourth Ave., New York 16, N.Y. 1953, 143 pp., \$4.50

A galaxy of British specialists contribute to this fourth volume in the beautiful **GARDENS AND GARDENING** series. It has to deal with rock and wall gardens, pools and streams, water lilies, water in the garden, and sinks and troughs. Anyone not familiar with the other three in this series has missed a flood of garden stimuli, both as to originality, beauty and practicality. Definitely worth while.

ROUND RIVER, by Aldo Leopold; Oxford University Press, 114 Fifth Ave., New York 11, N.Y. 1953, 173 pp., ill., \$3.00

53-9188

Aldo Leopold continues to rise in stature as one of our greatest conservationists as well as ecologists, above all forester. These papers are edited from his father's journals by his son, Luna, a conservation geologist. They are divided into three parts, — an introductory essay; "Country," "A Man's Leisure Time," which tells of a hunting trip through the Southwest; and "Round River," in which Wisconsin typifies one of Paul Bunyan's stories. The first chapter in this last section starts out with a definition of Conservation that bears repetition: "Conservation is a state of harmony between men and land."

—S—

SANCTUARY PLANTED, by Walter J. C. Murray; Roy Publishers, 30 East 74th St., New York 21, N.Y. 1953, 191 pp., ill., \$5.00

What happened when a British school teacher, outdoorsman, and amateur photographer sets out to make a combination argoretum, bird and wildlife sanctuary, is told here in a fashion which leads one to suspect that the author also teaches Composition.

SAND CRAB EMERITA TALPOIDA AND SOME OF ITS RELATIVES, by R. E. Snodgrass; Smithsonian Institution, Washington 25, D. C., 1952, 34 pp., 11 figs.

A monograph on the subject which lists as Smithsonian Miscellaneous Collections, Vol. 117, No. 8, Publication no. 4086.

SCIENCE IN PROGRESS, ed. by G. A. Baitsell; Yale University Press, New Haven, Conn., 1953, 285 pp., 103 figs., \$6.00

39-14778

This is Series VIII in the **Science in Progress** series. It contains papers on the origin and evolution of the uni-

verse by G. Gamow, the problem of the sun's atmosphere by W. O. Roberts, the earth's atmosphere by J. Kaplan, geology and evolution of insects by F. M. Carpenter, Africa and the origin of man by D. M. S. Watson, sensory physiology and animal orientation by D. R. Griffin, cooperation and conflict among primitive organisms by P. R. Burkholder, luminescent organisms by E. N. Harvey, microwave spectroscopy by C. H. Townes and molecular reaction in protein solutions by G. Scatchard.

SEE HOW THEY GROW, by M. Field, J. V. Durden and F. P. Smith; Penguin Books, 3300 Clipper Mill Road, Baltimore 11, Md., 1952, 169 pp., 64 pl., 3/6

Another one of those inexpensive paper-backed Penguins. This time about current films on plant life. The same authors did a Pelican Book in pre-war times on invertebrates entitled "Cine-Biology."

SECRET OF THE GREEN THUMB, by Henry T. and Rebecca T. Northern; Ronald Press Co., 15 East 26th St., New York 10, N. Y. 1954. 431 pp., 221 figs., 17 tables, \$5.00

To give gardeners the underlying botanical principles, which should clarify and motivate all that a gardener has to do, is the aim of this book. So clearly and cleanly is this achieved that the text could be used as a botany reference work. The Northern's are at the University of Wyoming where he is professor of botany and she is a free-lance writer for gardening magazines.

SEX DETERMINATION, by F. A. E. Crew; John Wiley and Sons Inc., 440 Fourth Ave., New York 16, N.Y., 1954, 68 pp., \$1.50

Another of those all-inclusive little Methuen Monographs which slip into the pocket so easily. The author is professor of social medicine and former professor of animal genetics at the University of Edinburgh.

SEXUAL BEHAVIOR IN THE HUMAN FEMALE, by A. C. Kinsey, W. B. Pomeroy, C. E. Martin, P. H. Gebhard. Research Associates; W. B. Saunders Co., West Washington Sq., Philadelphia 5, Pa. 1953, 842 pp., 151 charts, 179 tables, 4 pls. \$8.00

Perhaps no book has stirred up so much controversy since Mark Twain came out in favor of Francis Bacon against Shakespeare's authorship of the plays. So much, and so acrid, as well as so effusive, critical comment has been lavished on it that THE BIOLOGIST has no business kicking over its own policy of not offering critical reviews. Like Sir Christopher Wren's obituary in St. Paul's Cathedral: "**Si Monumentum Quærilis, Circumspice!**"

SO . . . NOW COLLITCH! by Herbert Nachman; The Dietz Press, Richmond, Va., 1952, 112 pp.

"Brag is a juvenile attempt to show somebody how important a nobody

can be. It usually makes people ill, especially in the Stomach and points North, and should not be indulged in by any human being over the precocious and ripe old age of 2. . . . It is guaranteed to make an egotistical ass out of even the most obnoxious bore. If you find yourself subject to sudden bragging-spells — have your head examined immediately. If the doctor can't find anything wrong with you — get yourself another doctor." (Sample from p. 29 of this choice collection of an old collegian's advice to his freshman son.)

SOCIAL BEHAVIOUR IN ANIMALS, by N. Tinbergen; John Wiley and Sons Inc., 440 Fourth Ave., New York 16, N. Y. 1953, 150 pp., 67 figs., 8 pl., \$2.50

Another Methuen Monograph on Biological Subjects, small and handy enough to slip into a pocket, not even slicker-sized at that. Function, causation and evolution are emphasized along with sequence of description, qualitative analysis, quantitative analysis, and emphasis on the need for continual re-synthesis, in the following of Lorentz.

SOCIAL INSECTS, by O. W. Richards; The Philosophical Library, 15 East 40th St., New York 16, N.Y. 1953, 219 pp., 51 pl., 12 figs., \$4.75

Bees, wasps, ants and termites, as shown up in the most recent continental research. The author is one of Britain's most distinguished entomologists. There is much information and there are many plates which are definitely not current in American entomological literature, — yet.

SOILS AND SOIL FERTILITY, by Louis M. Thompson; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1952, 339 pp., 136 figs., 132 tables, \$5.00

This book has been prepared by the professor of soils at Iowa State College as a one-semester course textbook. It assumes no previous college training in chemistry although admittedly a chemical background would be an asset. The author's experience in teaching soils for many years finds its most practical expression in this book.

SOME SCALE-BEARING POLYCHATES OF PUGET SOUND AND ADJACENT WATERS, by Marian H. Pettibone; University of Washington Press, Seattle 5, Washington, 1953, 89 pp., 40 pl. cont. 376 figs., and 4 text-figs. \$3.25 (in paper covers)

A taxonomic study of the 30 species of the superfamily **Aphroditoidea** found in the waters of Puget Sound, the San Juan Archipelago and adjacent waters.

SOUTH SEAS IN TRANSITION, by W. E. H. Stanner; Institute of Pacific Relations, 1 East 54th St., New York 22, N.Y. 1953, 448 pp., maps, \$6.00

Latest reports in book form on the changing **mores** among South Sea is-

landers due to the impact of Japanese aggression, Allied intervention and the return of mandated territories to Australian control. Curiously enough, the natives' first demand was for more and better education. The author is a noted anthropologist with a background of experience among aboriginal people. Anthropologists and social geographers, — human ecologists, — will want to study these matters with him.

SOUTHERN CROPS, by Paul W. Chapman and Roy H. Thomas; Turner E. Smith & Co., 441 West ePachtree St., N. E., Atlanta 3, Ga. 1953, 503 pp., illus., \$3.75

Anyone interested in agriculture in the Southern states will find this book profitable reading if he lives there. To others it will be revealing. Just how the South is facing and solving its own problems is a matter of concern to everybody. Cotton, corn, sweet potatoes, tobacco, peanuts, rice, sugar cane, small grains, and forage crops are the lifeblood of southern farming. This class-room manual, with its review questions at the end of each chapter, should help to understanding and appreciation of their importance.

STATISTICAL METHODS IN EXPERIMENTATION, by Oliver L. Lacey; Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1953, 249 pp., 33 figs., 23 tables, \$4.50

Aims to show students how to answer questions correctly by means of the statistical method. It is designed as a one-semester course textbook, and assumes that the student has a background of at least one semester of college algebra, although it admits that a good student with eighth grade arithmetic alone to build on, could probably get by with a little assistance. In a day when statistics speak louder than words, some such training as this is indispensable.

STORY OF SPICES, by J. W. Parry; Chemical Publishing Co., 212 Fifth Ave., New York, N.Y. 1953, 208 pp., \$4.50

Indirectly this book has something to do with botany. Really, it is a history of one of the most fascinating phases of the development of the botanical sciences. As such it belongs on the shelf with Harvey-Gibson's "History of Botany." From most ancient times to the present, spices have been an integral part of culinary, medical, and cosmetic production. This is their history, and a romantic one at that.

STREPTOCOCCAL INFECTION, ed. by Maclyn McCarty; Columbia University Press, 2960 Broadway, New York 27, N.Y. 1954, 218 pp., tables figs., etc., \$5.00

53-11453
The New York Academy of Medicine's seventh symposium on microbiology is summarized in these fifteen papers. Among those represented are Rebecca C. Lancefield, Alan W. Bernheimer, L. R. Christensen, Willard C. Schmidt, Dennis W. Watson, John H. Dingle, H. Sherwood Lawrence, Floyd

W. Denny, Jr., and Chandler A. Stetson, Jr.

SUPRARENAL CORTEX, a Symposium ed. by J. M. Yoffey; Academic Press Inc., 125 East 23rd St., New York 10, N. Y. 1953, 232 pp., figs., tables, \$6.80

Volume V of the Colston Papers contains the fifth symposium of the society held in the University of Bristol in April 1952. These papers pretty thoroughly explore the adrenal cortex in its relation to body functions, ACTH, cortisone, metabolism, etc.

—T—

TAXONOMIC TERMINOLOGY OF THE HIGHER PLANTS, by H. I. Featherly; Iowa State College Press, Press Building, Ames, Iowa, 1954, 166 pp., \$3.75

53-12176
The professor of botany at Oklahoma A. & M. College here presents a helpful book which has six good features. First, there is a 72-page glossary of botanical technical terms; then a subject classification list of 24 sub-headings, such as aestivation, habitats, positions, surfaces and vestures, time and season, tropisms, etc. The third section covers specific epithets with their meanings, like adenophyllous, algicaulis, marianus, etc. Next come Greek and Latin components of scientific words. The appendix is devoted to floral evolution, laws, theories and hypotheses, and lastly phyllotaxy.

TEACHING SCIENCE IN THE ELEMENTARY SCHOOL, by R. Will Burnett; Rinehart & Co., 232 Madison Ave., New York 16, N. Y. 1953, 541 pp., 142 figs., illus. \$5.25

52-14011
This book is for teachers in elementary schools. Part I considers the place science should have in the curriculum, and how it may be most practically taught. Part II supplies the teacher with materials and techniques, mostly ideas about what science is, weather, electricity, energy, earth and other planets, living things, and themselves.

TEAMWORK IN RESEARCH, by George P. Bush and Lowell H. Hattey; American University Press, 1901 F Street, N.W., Washington 6, D. C., 1953, 191 pp., figs., charts, etc. \$4.00

Proceedings of the third institute on administration of scientific research and development held by the American University in Washington with the cooperation of the National Research Council and the A.A.A.S. are here adapted for publication in book form. Eighteen top research people from university, government, and business, pooled their ideas and experience. They come to the conclusion that there are two distinct methods of research, — the specialized project confined to a single field of science, and the interdisciplinary project which demands skills one worker could not be expected to supply. The first type can best be handled by a single specialist, the second by group coordinated endeavor.

or. The book is mainly concerned with the second type, — how to get group research to coordinate and run smoothly.

THEORETICAL ANTHROPOLOGY, by David Bidney; Columbia University Press, 2960 Broadway, New York 27, N. Y. 1953, 506 pp., \$8.50

The author of this book is a member of the Indiana University staff. He started it as a research project under the Viking Fund, but gradually developed into a critical and historical analysis of modern cultural anthropology. Of it the renowned *doyen* of modern anthropology, Arthur Kroeber, said, "It marks the first time that a trained philosopher has exhaustively analyzed the central concept and principal currents of activity of a whole social science such as anthropology. It has originality and genuine significance in the stream of contemporary thought."

TISSUE CULTURE, by E. N. Willmer; John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y., 1954, 175 pp., 11 figs., bibl., \$2.25

This Methuen Monograph is the second revised edition of the original 1935 work. It takes all the work on tissue culture under scrutiny and brings it up to date. The bibliography for so small a volume is surprisingly complete with its 410 entries.

TRANSACTIONS OF THE DIEGO SOCIETY OF NATURAL HISTORY, San Diego, California, 1953:

Two Californian Mountain Snails, by S. Tillman Berry, 17 April. No. 12
Mollusks from Clipperton Island, by L. G. Hertlein & W. K. Emerson, 22 July. No. 13

Amphibians and Reptiles from Rancho La Brea, by Bayard H. Brattstrom, 4 Aug. No. 14

West American Razor-Clams, by S. Stillman Berry, 14 Aug. No. 15

New West American Marine Mollusca, by S. Stillman Barry, 1 Sept. No. 16
Pleistocene Invertebrate from SW San Diego County, by Emerson & Addicott, 10 Nov. No. 17

TRANSACTIONS OF THE WISCONSIN ACADEMY, Vol. XLII, Madison, Wisconsin, 1953, 312 pp.

Of the 17 papers presented at the 1953 sessions at Ripon College, 11 were of some biological interest. These included discussions on Wisconsin Cyperaceae, Parasitic Fungi, Cheese Manufacturing, Fish Parasites, Membracidae in the Arboretum, Stratiomyidae, White-tailed Deer, and on the decomposition of hard maple sawdust by treatment with anhydrous ammonia and inoculation with *Coprinus Ephe-merus*.

TRENDS OF LIFE, F. Wood Jones; St. Martin's Press, 103 Park Ave., New York 17, N. Y. 1953, 191 pp., \$2.50

Biological philosophizing of a definitely teleological nature winding up in this depressing thought: "Possibly we must abandon a belief in the progressive advance in intelligence of the

rank and file of mankind in response to any "evolutionary law." From what we have seen of the working of evolution it seems to be a very unlikely happening indeed." Before the author gets to this point he gives some very salty things to think about in a very salty fashion.

TROPICAL WOODS AND AGRICULTURAL RESIDUES AS SOURCES OF PULP, A Symposium; Columbia University Press, 2960 Broadway, New York 27, New York, 1952, 190 pp., 75 tables, 21 figs., \$2.00

With an introduction and a preface by H. Mark, this paper under the aegis of the Food and Agriculture organization of the United Nations, records the results of a symposium held at Appleton, Wisconsin, 15 September 1951. Eighteen papers on various phases are included. There is no index.

UNIVERSITY OF KANSAS PUBLICATIONS from the Museum of Natural History, Lawrence, Kansas, 1952

Taxonomy & Distribution of Some N. American Wild Rats, by Keith R. Nelson, No. 16

Subspecies of Mexican Red-bellied Squirrel, by Keith R. Nelson, No. 17

New Chipmunk from the Black Hills, by John A. White, No. 19

New Pinyon Mouse from Durango, by Robert B. Finley, Jr., No. 20

Annotated Check List of Nebraskan Rats, by O. L. Webb & J. K. Jones, Jr., No. 21

Variation in Southern Rocky Red-backed Mice, by E. L. Cockrum & K. L. Fitch, No. 22

Taxonomy & Distribution of N. American Microtines, by E. R. Hall & E. L. Cockrum, No. 23

Subspecific Status of Two Central American Sloths, by E. R. Hall & K. R. Nelson, No. 24

Taxonomy & Distribution of Some N. A. Marsupials, Insectivores and Carnivores, by E. R. Hall & K. R. Nelson, No. 25

Taxonomy & Distribution of Some N. A. Rodents, by E. R. Hall & K. R. Nelson, No. 26

Pocket Gophers of Coahuila, Mexico, by Rollin H. Baker, No. 28

Distribution of the Pocket Mouse, by J. Knox Jones, Jr., No. 29

—V—

VERTEBRATE EMBRYOLOGY, by Waldo Shumway & F. B. Adamstone; 389 pp., 256 figs., \$6.00

LABORATORY MANUAL OF VERTEBRATE EMBRYOLOGY, by F. B. Adamstone & Waldo Shumway; 98 pp., \$2.50; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1954.

54-6809

54-6809

This is the fifth edition of the textbook and the third of the laboratory manual. Both have been brought up to date. Illustrations have been improved, and such rearrangements as may improve the text have been carried out.

GENERAL VIROLOGY, by S. E. Luria; John Wiley & Sons Inc., 440 Fourth

Ave., New York 16, N. Y. 1953, 427 pp., 93 figs., 32 tables, \$8.50

53-11874
This is the first known textbook written for the teaching of the new science of Virology. As such it has had to break new ground, root out antiquated techniques and preconceptions, and build from the ground up with not altogether familiar materials.

VIRUS MULTIPLICATION, NATURE
OF, by Paul Fildes & W. E. Van Heyningen; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1953, 320 pp., \$6.50

This is the report of the second symposium of the Society for General Microbiology, held at Oxford University, in April 1952. There were sixteen papers read. Most of them dealt with aspects of virology, including bacteriophage, radio-biological methods, divalent metals in phage production, insect viruses, etc.

—W—

WAYS OF MAMMALS IN FACT AND FANCY, by Clifford B. Moore; The Ronald Press, 15 East 26th Street, New York 10, N. Y. 1953, 273 pp., \$3.50

53-10465
The advertising literature says this "absorbing book offers a complete description of the popular myths and superstitions about mammals that have persisted from the past." As far as the absorption is concerned this editor heartily concurs. This is one of those books you don't lay down until you finish. Is there something in human nature that tires of objective "facts" and wants to recapture part of the "fancy" that went with the beginnings of Science? However well, — and we do not minimize the beautiful job the author has done, — however well anyone does this job, he will not be through until he taps the real platinum mine of fancy that still is buried in the late mediaeval bestiaries, and the, as yet untranslated from the Latin works of Pliny, or "the Physiologus," as well as St. Isidore of Seville, Hugo of St. Victor, and St. Hildegard. Whoever taps these is going to have a field day, zoologically speaking. We do not mean to detract one jot or tittle from the credit that goes to Clifford B. Moore. We only hope that his modest book is the first streak of light that will break through the murk that has been clouding up the early horizons of zoological history. Between the days of Aristotle and Theophrastus, the "Fathers of Biology and Botany," respectively, and the Renaissance, there is more "Fact and Fancy" and some of it pretty good animal behavior, too, than most modern biologists are aware or would care to admit. That a lot of it is buried in the forgotten writings of the Fathers, Greek and Latin, of the Church is a thoroughly Ripleyesque "Believe It or Not."

WEED CONTROL, by Wilfred W. Robbins, Alden S. Crafts, Richard N. Raynor; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y.

1952, 503 pp., 155 figs., 32 tables, \$8.00
52-5998

In the ten years since this text was first issued weed control has undergone some far-reaching developments. Along with that development has gone a wider appreciation of the weeds as unwelcome pests. This necessitated complete revision and in some cases total rewriting. This almost-new volume will challenge the interest of all concerned.

WESTERN FRUIT GARDENING, by Reid M. Brooks and Claron O. Hesse; University of California Press, Berkeley 4, Calif. 1953, 287 pp., ill., \$4.50

The subtitle tells about all one might wish to know off-hand about this new book: "A handbook for the home gardener on fruit varieties; climatic adaptations; soil, water and nutrient requirements; pruning and propagation; control of diseases and pests." The second part of the book lists and discusses alphabetically some forty-eight kinds of fruits grown, or growable, in the region from northern Washington to southern California and western Arizona.

WILD FLOWERS OF AMERICA, by Walcott, Platt & Rickett; Crown Publishers, The Greystone Press, 100 Sixth Ave., New York 13, N. Y., 1953, 472 pp., 400 pl., \$10.00

53-9972
This book will not be the collector's item the original issue of the Walcott floral plates was which sold for \$500.00 in deluxe portfolios and for \$100.00 in plainer sets. These are the same plates, as carefully printed, but in ever so much more handy form. Even those who had the original plates bound up into a four or five volume set found them difficult to handle. The added advantage of Dr. H. W. Rickett's introduction and detailed description of each plate is also worth being taken into consideration. Taxonomists may balk at the scientific names not being complete since only the Latin genus and species names are given, while the authority or the variety, if any, are not. Since this is mostly a book to enjoy, and more for the private owner than institutional users, this objection will probably not unduly hurt the sale of a truly beautiful book.

OUR WILDLIFE LEGACY, by Durward L. Allen; Funk & Wagnalls, 153 East 24th St., New York 10, N. Y., 1954, 422 pp., ill., \$5.00

53-10792
From a new sources comes a new book on conservation of America's wildlife resources. He is currently with the Fish and Wildlife Service of the Department of the Interior. "My intent," he says, "is to cover a wide range of popular interest — from the hunter and fisherman to the bird lover and naturalist. The job at hand is to extract the significant facts and relate them in such a way that the citizen can do his own thinking."

WILDLIFE MANAGEMENT, Vol. II, by Reuben E. Trippensee; McGraw-

Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1953, 572 pp., 174 illus., tables, \$7.50

48-285

This is the second and companion volume to the author's first in "The American Forestry Series." This volume deals with the fur bearers, the waterfowl, and the fish. The author heads right into the water, or rather, into the lack of it, at the beginning of this challenging book. He discusses the management of water or wet lands, and the life history of each of the important fur bearing animals, waterfowl and game fish.

WINOGRADSKY, SERGEI N., HIS LIFE AND WORK, by Selman A. Waksman; Rutgers University Press, New Brunswick, N. J. 1953, 150 pp., 8 pl., \$4.00

53-12648

We owe much of our knowledge of the autotrophic bacteria, non-symbiotic nitrogen fixing organisms, the oxidation of sulfur, cellulose decomposition by bacteria, and soil microbiology to the eminent savant whose biography has just appeared. That Dr. Waksman has written the biography would in itself be reason for reading it. That he was Winogradsky's friend and quasi-official biographer make this work one of those happy scientific coincidences that occur one in a life-time. The story is enlivened by direct quotations from Winogradsky's letters. He died 5 March 1953, aged 96 years, 5 1/4 months.

WONDER DRUGS, SCIENCE BOOK OF, by Donald G. Cooley; Pocket Books Inc., 630 Fifth Ave., New York 20, N. Y., 1954, 247 pp., 16 figs., 35c

54-6544

This Cardinal Book is published hard on the heels of the regular edition which came out two months ago. They are the same in content, although considerably different in price. Libraries will probably want the larger Franklin Watts Inc., edition. The smaller pocket sized will probably appear on many pocket-book counters. It covers in popular and very readable style the sulfas, the antibiotics, the hormones.

WONDERS OF MODERN MEDICINE, by Steven M. Spencer; McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y., 1953, 276 pp., \$4.00

53-9893

Most of the stories in this book have appeared in THE SATURDAY EVENING POST since 1945. They represent

medical reporting at its best, and cover, among others, some of the drama in the fight against polio, TB, brain tumor, dropsy, cancer, diabetes and arthritis.

WORLD BENEATH THE SEA, by Otis Barton; Thomas Y. Crowell Co., 432 Fourth Ave., New York 16, N. Y. 1953, 245 pp., 14 illus., \$3.50

52-13123

Diving in Cotuit Bay, travelling with native divers in Zamboanga, fossil hunting in Persia, suit-diving in the Bermudas, diving with Beebe in his bathysphere, fishing tiger shark in Panama, filming marlin underwater in Hawaii, photographing sea elephants on Guadalupe, hunting lost anchors for the Navy on the bottom off Martha's Vineyard, combat photographer in Dutch New Guinea, deep sea trolling off Peru, catching lung-fish in Australia, diving along the Great Barrier Reef, designing the benthoscope and descending in it to 4500 feet, — these are some of the adventures, true ones, described in this unusual book.

—Y—

YOU CAN LEARN HOW TO STUDY, by Daymond J. Aiken; Rinehart & Company, 232 Madison Ave., New York 16, N. Y., 1953, 58 pp., illus., \$1.00

53-5352

The seven chapters in this little student guide are entitled: "Why are good study habits important? Plan your work. How to improve your reading. How to tackle your books. How to take notes. How to do creative work. What to do about examinations."

YOUR ARTHRITIS, by Alfred E. Phelps; William Morrow & Co., 425 Fourth Ave., New York 16, N. Y., 1953, 192 pp., 7 figs., 2 tables. \$3.00

A revised and expanded edition of a book that has helped many arthritics, telling patients what they can do to make life more bearable while under a doctor's care, and as an aid to doctors in getting the patient to help himself.

GUIDE TO THE LITERATURE OF ZOOLOGICAL SCIENCES, by Roger Smith; Burgess Publishing Co., 26 S. Sixth St., Minneapolis 15, Minn., 1952, 133 pp., \$2.50

A manual which may be used simply as its title indicates, or as an outline for a course to teach zoologists how to write scientifically as well as publicationally acceptable articles. It is NOT a list of books. It tells how to go about finding books, or almost any other kind of printed information.



EDITORIALS

FLORIDA, HERE WE COME!

The general convocation, the biennial meeting of all the delegates of the Chapters of Phi Sigma, will be upon us before we know it, or before another issue of the *BIOLOGIST* comes from the press.

The meeting will be held on the campus of the University of Florida, which is the home of SIGMA, one of our older Chapters. The university is situated on the western edge of the city of Gainesville, about which a briefing for all our membership might be in order.

Gainesville, the seat of Alachua County, is a good-sized university city of about twenty thousand inhabitants. It takes its name from a native of Virginia, Major-General Edmund Pendleton Gaines, (1777-1849) who in his early military career arrested the traitor Aaron Burr, and was one of the witnesses in his trial. Later, as a major in the army during the War of 1812, he so successfully defended Fort Erie against the British that he was given a Congressional Medal.

Previous to 1853, when the place received its present name, it was only a trading post with a small settlement known by the rather colloquial name of "Hog Town." Strategically located at almost the center of the narrowest part of the Floridian peninsula, Gainesville is eighty-five miles southwest of Jacksonville, and one hundred thirty-five miles southeast of the State Capital, Tallahassee. It is served by the Seaboard and the Atlantic Coast Line railroads, and, at the junction of several highways, by the Florida Motor Lines. The local industries include lumber, manufacturing of naval stores and tung oil, in addition to a thriving agricultural activity.

The climate of this part of Florida is semitropical, with an average mean temperature of 69.9. This moderate climate, where frost seldom occurs and the humidity rarely changes, plus its situation in the rolling farmlands midway between the Atlantic Ocean and the Gulf of Mexico, has made it a favorite recreation spot. There are good golf courses, the neighboring freshwater lakes are said to abound with fish, and deep sea waters are only a two-hour drive either east or west. The city has the reputation of being the cleanest in the state. It is the site of the state historical museum and archives which are located on the university campus.

The University of Florida was founded in 1853. It occupies a 1000-acre tract of land, of which about a hundred are used for campus. A Memorial Forest of 2000 acres nearby, and the 2500-acre conservation project at Welaka, some 30 miles southeast, all afford additional facilities. The university library has over 150,000 volumes.

Since 1935 the University has maintained a General College, with a core curriculum which is required of all freshman and sophomore students. Major work is mostly confined to the upper division courses at the junior and senior levels. The component colleges, schools or divisions in which this advanced work may be done number some fifteen, and include, in addition to the Graduate School, Agriculture, Architecture and Allied Arts, Arts and Sciences, Business Administration, Education, Engineering, Forestry, Law, Pharmacy, Physical Education and Health, Music, Military Science, etc. There is a general as well as an agricultural extension service. The summer school is operated on a twelve weeks session with two terms of six weeks each. There are more than half a hundred buildings on the campus to house all these activities, and a num-

ber of dormitories for single men, for single women, and for married students.

SIGMA CHAPTER was founded there on December ninth in 1925. The Chapter, which started as a biological club later known as Beta Omega, was installed as an integral part of Phi Sigma by Dr. R. C. Rhodes of Mu. Of the original petitioning biology club members, Alexander, Copeland, Dann, Johnson, Layman, Walker and Wiig, there were four still in the University when the Charter was granted. Secretary at that time was the present Dr. Marston Bates who was later to work in Honduras, and who honored the 1952 Convention of Phi Sigma by attending our banquet during the sessions. In those early years the members of Sigma made good use of the University Biological Station on Newman Lake, and the Welaka Forest, conducting meetings, initiations and picnics in both.

By 1929 Sigma Chapter had a cumulative record of 41 initiated members. During the bad years of the depression the State Legislature so restricted its appropriations to the University that its activities were pretty severely handicapped, a situation which made itself felt all over the campus. The chapter went into a tail-spin. However, there was a handful of faithful souls among the faculty and graduate students who were quick to seize the opportunity when better times returned to reorganized the chapter. By 1939 there was a total of 183 initiates on Sigma's roster.

Biological Sciences on the Floridian campus are not introverted or ingrown. The faculty members were originally recruited from all over the country, and many of them were members of various Phi Sigma Chapters. Our meeting in Gainesville promises to give us a chance to get better acquainted with them, to meet old friends and, we are sure, to make new ones.

THE GENERAL CONVOCATION COMING UP

The Council of Phi Sigma was established away back in the beginnings of our Society for the purpose of tying our far-flung Chapters together, and to carry on the work of the Society in the periods between the biennial meetings.

The Chancellor, the Vice-Chancellor and the Secretary of the Council have all explained the relationships of the Council and the Chapters to you in their respective messages which follow on the next few pages. Please read them carefully, and, as it says somewhere in the Scriptures, "from the elders, learn—"

Your Editor went to his first Phi Sigma Convention as a Chapter Secretary and delegate in 1924 in Kansas City. There were only thirteen Chapters then, down to Omicron in the Greek alphabet. This year we have not only completed the second ring of chapters but are looking forward to starting the third.

With the exception of the war years, ye Ed has seen most of the national or general meetings. He has also seen about every kind of a personality a chapter could select as a representative. There have been American, and foreign born, — Hindoo, Chinese, — white and negro, Jews and gentiles, Protestants, Catholics, and of no denominations. They came from the north and the south, the east and the west, — and they must have done a good job each time, because Phi Sigma is still in business at the old stand, having survived two wars, a depression, Heaven knows how many national and local recessions, and the "cold war."

And all of this in spite of some of the weirdest possible convention situations. Believe it or not, there was once a department head who was elected

(we'll pardon you if you laugh, politely,) by his Chapter as a Delegate. And then there was that pair of wide-eyed innocents, sort of Hansel and Gretel-ish children, who came from different parts and different Chapters but got acquainted on the train en route. They registered in, alright, but the rest of us didn't see much of them, and we often wondered what sort of a report their respective Chapters got on that meeting, — the convention, if you get what we mean.

There were lots of other funny things that happened at different meetings which have no place on these dignified pages. We always manage to enjoy these biennial sessions, — there is no valid reason why we shouldn't. In fact, our common interests, our common membership, and our desire to do the most for the greatest number in Phi Sigma, are always a warrant that the biennial conclaves will be happy, and that good fellowship, and good sportsmanship will abound.

If there is one thing this Editor might think, wish, hope, desire, pray for, and anticipate, it would be that every Chapter Delegate would be a dynamic personality with a happy faculty of getting things done happily, WHO WILL BE SURE TO BE BACK WITH HIS OWN CHAPTER, in the school year of 1954-1955.

If Phi Sigma can't be sure of that, it might just as well go back to the cold and wet and soggy weather of the winter meetings.

AND ABOUT THIS BIOLOGIST?

This issue of the Society's magazine will be the only one published for and during the current school year. The issue you received in March was the last number of the 1952-53 volume. This is not a new, even if a very rare, occurrence. It happened in 1948, when volume thirty consisted of a composite like this.

The General Meeting of Phi Sigma at St. Louis in 1952 gave the Council a mandate to investigate whether the Society's magazine could be more economically published. A Committee was appointed to assist the Council in that investigation. The Committee was not heard from, so, in view of the forthcoming Gainesville meeting, your editor took the bull by the horns, and with the consent of the Council, transferred the printing job to a different location.

Just how much economy we have effected this year will appear at the sessions in Gainesville, when the financial situation of our national group comes up for reporting.

Meanwhile your Editor has an obligation to make a few pleasant acknowledgements.

Our gratitude first of all goes out to all those who wrote in to express their minds on the last issue of THE BIOLOGIST. They were interested in our experiment, and the results apparently won an approval which they did not hesitate to express.

Secondly, our gratitude goes out to those who didn't write in to express their minds. "*Qui tacet, consentire videtur*," oder wie auf Englisch: "Silence means consent." For this, thanks too.

Finally, but in no sense least, the Editor wishes to thank every single member of The Journal Publishing Company's staff who had anything to do with getting out that first issue in a new location. They had only the last Milligan issue to go by, but they did what this Editor thinks was a very satisfactory job.

THE COUNCIL CALLS 15th GENERAL MEETING

According to instructions and authority vested in me by the Constitution and by-laws of Phi Sigma Society, I do hereby declare the period September 5-8 as the 1954 General Meeting. It is at biennial meetings such as this that the operational policies and other business matters of the Society are established by the chapters through their delegates. The National Council serves at these meetings and in the intervening times only to carry out constitutional procedures and to afford continuity in organizational matters.

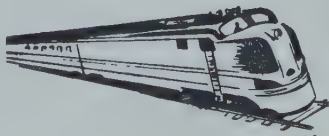
Accepting the invitation of Sigma Chapter, I declare the convention site to be Gainesville, Florida, and with Council cooperation have set the time of these meetings to coincide with the annual conclave of the American Institute of Biological Societies at the University of Florida.

Each chapter of Phi Sigma is urged to: (1) instruct its delegate to perform in those matters which will be called to its attention for action by the Executive Secretary of the National Council; (2) bring to the convention any items of new business; (3) study the programs of the concurrent sessions of the A.I.B.S. and ask the delegate to report back on research papers or demonstrations of particular local interest.

In spite of serious and personal pledges of delegates of the General Meeting of 1952 in St. Louis, no new chapters have been added to the Society's roster in the time since then. It is extremely urgent that new chapters be added at this time. Phi Sigma will

be able to fulfill its role in the promotion of interest and research in the biological sciences in years to come only if this takes place. It is the specific duty of each existing chapter to labor towards this end. Phi Sigma is doomed unless its members press forward to meet the growing opportunities in biological-science education and investigation. In the next decade college enrollments are expected to skyrocket. More institutions will become eligible for participation as chapters of Phi Sigma than ever before because of this impetus of increased numbers of students. The groundwork for the formation of new chapters should be laid now, and the responsibility is squarely in the hands of local chapters and their members. It is my personal plea that chapter delegates arrive at the General Meeting with a full report of his chapter's efforts to organize new groups in nearby educational institutions. Council representatives and the faculties of the several institutions in which chapters of Phi Sigma exist should be consulted in this matter. Their ideas and suggestions will be of great value.

Fraternally,
Karl F. Lagler
Chancellor



VICE-CHANCELLOR
STEWART'S LETTER

Mesa, Colo., Mar. 30, 1954
To the Chapters of Phi Sigma,

Greetings:—

This will be the last time I will have an opportunity to address the membership of the Society before the approaching national meeting, therefore I wish to urge every chapter to use all possible diligence in selecting its delegate to the meeting. In turn I wish to call the attention of the chosen delegates to the vital seriousness of the business of the meeting as it affects the welfare of the Society as a whole. As one who has had long time service in the organization and has its welfare close to my heart I feel that I am qualified to make a few observations.

Aside from the scholastic and scientific attainments of the Society the matter of officers, both at the chapter level, the meeting delegate, and the selection of national officers is very important. I think that perhaps you all know what the results are when the officers of the local chapter fail to function. No matter how fine a man or woman may be and how richly endowed and gifted as a teacher or how highly admired and respected as a teacher by the students such persons are often the most dismal failures as officers. In the past such individuals have well nigh wrecked the organization even tho they were sincere and well intentioned. Therefore in considering a person for office at any level there are many, many things for consideration than just that a person is popular, a good student or a greatly admired teacher.

Hoping to see many of you at Gainesville.

Fraternally yours,
Erwine Hall Stewart.

EXECUTIVE SECRETARY
ORCUTT'S LETTER

To: All Active Chapters of Phi Sigma
From: Executive Secretary of the Council

Subject: Biennial General Meeting of The Society

Your Council believes that the biennial meeting of Phi Sigma Society may have the greatest value to the delegates and the Society as a whole by scheduling it in conjunction with the meetings of some twenty other societies of the American Institute of Biological Sciences. The A.I.B.S. meeting this year is to be at the University of Florida at Gainesville, September 5 through 9. The Convention Director has extended us a very cordial invitation to meet with them, and Sigma Chapter at Gainesville unanimously voted to extend us an invitation to hold our General Meeting at Gainesville.

First class round trip railroad fare will be furnished each official delegate from the Society's Treasury and it is quite possible that the Council may find it possible to take care of some other expenses as well. The delegates housing in dormitories will be reserved by the Executive Secretary; the rate will be \$2.25 per night. It is estimated by the AIBS Convention Director that meals will cost \$2.00 or less per day in the University dining room. AIBS registration fee is \$3.00 and includes the program. Subsistence expenses are met by the delegate or by the chapter he represents if the local finances warrant. In the past, such expenses (other than the transportation paid by the national treasury) have been paid in full by a few chapters, half expense by about 50 per cent of the chapters, and some of the expense by a few others.

In addition to business sessions and a Society banquet, there will be at least two field trips of biological interest to Silver Springs and Marine-

land. All members of Phi Sigma are urged to participate in the activities of our 1954 General Meeting (voting on official business of the Society will, of course, be limited to the official delegates — one from each chapter).

Selection of Official Voting Delegate and Alternate

These selections *must* be in accordance with Article II, Sec. 4 (a) of the Constitution. "Each chapter in good standing shall be entitled to representation by *one* delegate or alternate duly chosen by the Chapter from its *active student* membership and certified by the Chapter President and Corresponding Secretary." Please note that faculty or honorary members are not eligible; faculty members are defined in Article IV, Sec. 4 as "rank of full time instructor or higher".

The Chapter President and Secretary must see that the official General Meeting certificate is properly filled out in duplicate. For the delegate to receive his travel allowance check before the meeting, one copy of the certificate must be mailed without delay.

It is customary for the chapter delegate to be properly instructed as to the items the chapter wishes discussed and how the chapter wishes to vote. It might be well for the chapter officers and delegate to look over the minutes of previous national meetings from the chapter files to acquaint themselves with items that have been previously discussed. Two Council offices are up for election at this General Meeting—Vice-Chancellor and Treasurer.

Sincerely,
Fred S. Orcutt
Executive Secretary



In The Editor's Mail

April 9, 1954

Dear Padre:

Thanks for sending along the recent issue of *The Biologist*. I took some time to read it and with your new printer it looks as though things are working out alright.

Last November at the Beta initiation I was asked to give a talk on our Egyptian venture. I have done so on a few occasions since but that was the first one since my return stateside. Evidently the material proves of interest and one of the members of the officer group asked if I would send something along to you for the *Biologist*. I started to write an article but there is just too much happening to get the thing in the shape I want it to be. However, I did write an article for Mrs. Palmer, the WHO publicity agent in Alexandria (our Regional office). You can leave off the "hot air" about me but it seems to me the article written for newspaper work could serve to get across what it is WHO is trying to do in this program. Anyway, look it over and if you want to use it feel free to do as you like. It bothers me not to be able to do better by Phi Sigma at this time!

In just two weeks I shall be flying back to Egypt. I'll stop to see Dr. Claude Barlow who worked in Egypt on Schistosomiasis (Bilharziasis) for a dozen years under Rockefeller auspices. Then I hope to see my mother in N. J. She is 78. I'll also give a seminar at Cold Spring Harbor (27th). Will fly out KLM on 29th and hope to spend Friday, Saturday, and part of Sunday with my Dutch relatives and friends. Have some conferences scheduled at Geneva and then on to Cairo to wind up this Egypt 10 project, i.e., write a final report, appraise our work and tie the job into the larger program started around our tract and called Egypt 5—the Health Demonstration Program.

Sorry I am such a lousy correspondent! I do think of you and our Phi Sigma council group often. — By the way I had a swell time giving a seminar at Notre Dame on Mar. 16! They are a fine bunch there and am glad to have had that chance to get acquainted.

With my very best wishes,
Yours, as ever,
Hank
(Dr. Henry vander Schalie)
Museum of Zoology
University of Michigan

Dear Dr. Keefe:

Recently I received a copy of THE BIOLOGIST — presumably sent by you. I greatly appreciate your courtesy and enjoyed reviewing the journal. It seems you have editorial trials and tribulations, but even so you are succeeding in editing a very interesting and worth while publication. My best wishes for your continued success.

Sincerely yours,
H. H. Krusekopf
Editor
Gamma Alpha Record
(Department of Soils,
College of Agriculture
University of Missouri)



Dear Dr. Keefe:

We thank you very much for the copy of "The Biologist" received recently containing a short review on our "Nature Atlas of America."

We would like to call to your attention and have it rectified, if possible, the fact that the price of this publication is not \$10.00 but \$7.50.

Very truly yours,
Stuart L. Hammond,
Manager, Advertising and
Publicity
C. S. Hammond & Co.
Maplewood, N. J.

Dear Father Keefe:

I read my last copy of "The Biologist" almost cover to cover. It was "good to the last drop" and nothing wrong with "the last drop". With so many duties, how you find time to edit this quarterly and do it so well, is beyond me. Anyway, CONGRATULATIONS.

Sincerely,
L. F. Graber
Professor of Agronomy
College of Agriculture
University of Wisconsin

Dear Padre:

The May BIOLOGIST arrived this morning and it really looked good. I enjoyed it the most for a long time.

I sincerely hope that all goes well with you these days.

Cordially,
Fred A. Barkley, Ph.D.
Director
Research Microbiology
Nepera Chemical Co., Inc.
Nepera Park, Yonkers 2,
N. Y.

CHAPTERS, OFFICERS AND ACTIVITIES

Each issue of the BIOLOGIST devotes this section to such of the activities of the Chapters as the respective Editors, Secretaries, or Council Representatives see fit to send it. As a medium of inter-chapter idea-exchange it offers opportunities for the chronicling of local events important in the society, lists of initiates' names, etc.

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Local Editors are expected to keep the Editor of the BIOLOGIST informed of a) changes in the officers of their chapters; b) names of initiates; c) names of those who receive the Phi Sigma Awards, d) other chapter activities, honors to chapter alumni, significant events among the biologists on their respective campuses.

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THE GENTLEMEN'S AGREEMENT

Between the two biological societies, Tri Beta (Beta Beta Beta) and Phi Sigma there has been a long-standing gentlemen's agreement that neither would establish on a campus where the other had a chapter in operation. It was also reciprocally agreed that Tri Beta would confine its future chapter installations to those undergraduate schools where only bachelor's degrees are granted, while Phi Sigma would establish chapters only in schools where there is graduate as well as undergraduate work.

Since we are considering an active campaign for the good of Phi Sigma, it becomes increasingly important that we drop any consideration of the following institutions which are listed in the Beta Beta Beta rosters:

Alabama College (for women), Montevallo, Ala.

Albion College, Albion, Mich.

American University, Washington, D. C.

Arkansas State College, Jonesboro, Ark.

Augustana College, Rock Island, Ill.

Baylor University, Waco, Texas.

Bethany College, Bethany, West Va.

Bowling Green State University, Bowling Green, O.

Brigham Young University, Provo, Utah.

California State Polytechnic College, San Louis Obispo, Calif.

California University, Santa Barbara, Calif.

Canisius College, Buffalo, N. Y.

Carroll College, Waukesha, Wis.

Carthage College, Carthage, Ill.

University of Chattanooga, Chattanooga, Tenn.

University of Puerto Rico, College of Agr. & Mech. Arts, Mayaguez, P. R.

Colorado A. & M. College, Fort Collins, Colo.

Colorado Western State College, Gunnison, Colo.



- Cornell College, Mount Vernon, Iowa
 Delta State Teachers College, Cleveland, Miss.
 De Paul University, Chicago, Ill.
 De Pauw University, Greencastle, Ind.
 Drake University, Des Moines, Iowa.
 Drew University, Madison, N. J.
 Drury College, Springfield, Mo.
 Fresno State College, Fresno, Calif.
 Georgetown College, Georgetown, Ky.
 Gettysburg College, Gettysburg, Pa.
 Hamline University, St. Paul, Minn.
 Harris Teachers College, St. Louis, Mo.
 Hartwick College, Oneonta, N. Y.
 Hofstra College, Hempstead, N. Y.
 Hood College, Frederick, Md.
 Hope College, Holland, Mich.
 Huntington College, Montgomery, Ala.
 Iowa State Teachers College, Cedar Falls, Iowa.
 Iowa Wesleyan, Mt. Pleasant, Iowa.
 John B. Stetson University, Deland, Fla.
 Kansas State Teachers College, Emporia, Kan.
 Lake Forest College, Lake Forest, Ill.
 Louisiana Northwestern State College, Natchitoches, La.
 Marietta College, Marietta, Ohio.
 Mary Baldwin College, Staunton, Va.
 Miami University, Coral Gables, Fla.
 Mississippi Southern College, Hattiesburg, Miss.
 Mississippi State College, State College, Miss.
 Mississippi State College for Women, Columbus, Miss.
 Mississippi University, University, Miss.
 Missouri Valley College, Marshall, Mo.
 Monmouth College, Monmouth, Ill.
 Morningside College, Sioux City, Iowa.
 Murray State College, Murray, Ky.
 Chadron State Teachers College, Chadron, Neb.
 Peru State Teachers College, Peru, Neb.
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 Newcomb College, New Orleans, La.
 North Carolina Women's College, Greensboro, N. C.
 North Central College, Naperville, Ill.
 Northwestern University, Evanston, Ill.
 Notre Dame College of Maryland, Baltimore, Md.
 Oklahoma City University, Oklahoma City, Okla.
 Southwestern State College, Weatherford, Okla.
 Pacific College, Stockton, Calif.
 Peabody College, Nashville, Tenn.
 Pennsylvania State Teachers College, Edinboro, Pa.
 Pittsburgh University, Pittsburgh, Pa.
 Portland University, Portland, Ore.
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 Puerto Rico University, Rio Piedras, P. R.
 Randolph-Macon College, Ashland, Va.
 Richmond University, Richmond, Va.
 St. Laurence University, Canton, N. Y.
 San Jose State College, San Jose, Calif.
 Simpson College, Indianola, Iowa.
 Spring Hill College, Spring Hill, Ala.
 Texas State College for Women, Denton, Texas.
 Texas State College North, Denton, Texas.
 Thiel College, Greenville, Pa.
 Toledo University, Toledo, Ohio.
 Wake Forest College, Wake Forest, N. C.
 Wartburg College, Waverly, Iowa.
 West Virginia Wesleyan College, Buckhannon, West Va.
 Western Maryland College, Westminster, Md.
 Westminster College, New Wilmington, Pa.
 Whitworth College, Spokane, Wash.
 William Jewell College, Liberty, Mo.
 Winthrop College, Rock Hill, S. C.
 Wittenberg College, Springfield, Ohio

PREMEDICAL SOCIETY MEETS

The tenth national convention of Alpha Epsilon Delta, national premedical honor society, was held at Indiana University on March 25-27, 1954. As part of the program, Dr. J. W. Ashton, Vice-President and Director of Educational Services, and Associate Dean George R. Waggoner, College of Arts and Sciences, Indiana University, described the objectives and operations of the premedical advisory program at Indiana University.

Dr. Aura E. Severinghaus, Associate Dean, Faculty of Medicine, Columbia University, received the first Alpha Epsilon Delta Distinguished Service Award, consisting of a medal and citation, for his outstanding contributions to premedical education, and presented the banquet address on the subject "So You Want To Be a Doctor".

On Saturday, March 27, an Indiana All-state Premedical Conference was sponsored in cooperation with the School of Medicine at Indianapolis. Dr. C. E. Kaslow, Professor of Chemistry, Indiana University, Dr. John D. Van Nuys, Dean, School of Medicine, Indiana University, Dr. Norman F. Witt, Head, Department of Chemis-

try, University of Colorado; Dr. David Tucker, Chairman, Committee on Admissions, University of Cincinnati School of Medicine; Dr. Paul M. Harmon, Chairman, Department of Physiology, Indiana University; and Dr. Arch E. Cole, Director of Admissions, University of Louisville School of Medicine participated in the program as speakers on problems pertaining to premedical education.

Approximately two hundred premedical students and faculty advisers representing fifty-seven of the sixty-four Alpha Epsilon Delta chapters attended the meetings at Bloomington and Indianapolis.

The following national officers were elected for 1954-56: President - Lloyd R. Gribble, Professor of Zoology, Premedical Adviser, West Virginia University; Vice-President - J. B. Price, Head, Chemistry Department, Millsaps College; Secretary-Historian - Maurice L. Moore, Vice-President, Vick Chemical Co.; Norman F. Witt, Head, Department of Chemistry, University of Colorado; and National Councilor - John A. Fincher, Professor of Biology, Howard College, Birmingham.



Notice

To the employer of biologists and agriculturalists the American Institute of Biological Sciences offers the following three-fold placement service:

- 1 - **A list of available persons** with a summary of qualifications of each published in booklet form in June and December of every year.
- 2 - **An active file of available persons** which may be consulted at any time.
- 3 - **A placement office at AIBS conventions** where any employer may interview candidates.

Applicants now registered with the AIBS Placement Service number about 125 in 18 fields of biological and agricultural sciences. Approximately 90% of the registrants have earned the doctorate degree. About 85% express a preference for a position involving both teaching and research. Many are qualified for administrative positions. This is a reservoir of highly trained specialists which you should be able to utilize effectively.

The charge to an employer who uses the Placement Service is nominal:

- 1 - Each placement list is \$1.00, which is approximately the cost of its publication;
- 2 - **A charge of \$1.00** is made for each time an employer consults the active file of registrants;
- 3 - **No charge is made to the employer** for use of the AIBS convention placement facilities.

The June issue of the Placement List is now being prepared. If you would like to receive a copy, please write to the following address, enclosing \$1.00 for each copy ordered:

AIBS PLACEMENT SERVICE

American Institute of Biological Sciences
2101 Constitution Avenue
Washington 25, D. C.

IN THE PHI SIGMA CHAPTER

The President —

1. Calls and presides at Chapter and Executive Committee meetings.
2. Conducts Initiations and Installations as Custodian of the Ritual.

The Vice-President —

1. Acts for and in the absence of the President.
2. Is Chairman of the Membership Committee and directs its activities.
3. Is a member of the Executive Committee.

The Recording Secretary* —

1. Takes Roll Call at all Meetings.
2. Keeps a file of all Chapter Correspondence.
3. Is Custodian of the Permanent File of all members.
4. Is Custodian of the Chapter Insignia and the Charter.
5. Is a Member of the Executive Committee.

The Corresponding Secretary* —

1. Conducts all current Official Correspondence.
2. Reports all Membership Elections to the Council Secretary.
3. Reports number of BIOLOGISTS needed to the Council Treasurer and Editor.
4. Distributes BIOLOGISTS to all Honorary, Faculty and Chapter Members.
5. Is a Member of the Executive Committee.

The Treasurer —

1. Collects all Membership Fees and Local Dues.
2. Pays all Chapter local bills.
3. Transmits all Membership Fees to the Council Secretary.
4. Is a Member of the Executive Committee.

The Editor —

1. Promptly reports all news-worthy Chapter Activities to the Council Editor.
2. Acts as Public Relations Officer for the Chapter.
3. Is not a voting member of the Executive Committee.

The Council Representative —

1. Functions for and with the Council Secretary in default of the local Chapter Officers.

* Where only one Secretary is elected by a Chapter it is expected that both these functions will be carried out by that person.

PHI SIGMA
BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although always designated as an honorary biological research society, it should be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

MILE POSTS

- 1915 March 17, Alpha Chapter organized, Ohio State University, Columbus.
- 1916 May, Central Governing Body organized, BIOLOGIST first issued.
- 1917 June, last War-time BIOLOGIST issued.
- 1921 February, BIOLOGIST revived.
- 1924 December, First National Meeting, Constitution revised, Washington, D. C.
- 1925 December, Second National Meeting, First Science Program, Kansas City.
- 1926 December, Third National Meeting, Second Science Program, Philadelphia.
- 1927 December, Third Science Program, Nashville.
- 1928 December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.
- 1930 January, Council Meeting, Ritual Revised, Norman, Okla.
December, Fifth National Meeting, Fifth Science Program, Cleveland.
- 1931 Phi Sigma Letters Registered, U. S. Patent Office.
- 1932 December, Sixth Science Program, Atlantic City.
- 1933 June, Sixth National Meeting, Seventh Science Program, Chicago.
- 1935 December, Seventh National Meeting, Eighth Science Program, St. Louis.
- 1937 December, Eighth National Meeting, Ninth Science Program, Indianapolis.
- 1939 December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.
- 1941 December, Tenth National Meeting, Dallas, Texas.
- 1946 December, Eleventh National Meeting, Boston, Mass.
- 1948 December, Twelfth Meeting, Eleventh Science Program, Albuquerque, N. Mex.
- 1949 February, Joins the ASSOCIATION OF COLLEGE HONOR SOCIETIES.
- 1950 December, Thirteenth Meeting, Denver and Boulder, Colorado.
- 1952 December, Fourteenth Meeting, St. Louis, Mo.